SQUAW CREEK NARRATIVE REPORT January-December 1966

1966

NARRATIVE REPORT

SQUAW CREEK NATIONAL WILDLIFE REFUGE

PERMANENT PERSONNEL

Refuge Manager . . . . . Harold H. Burgess
Biological Technician. . . . . Albert J. Yocum
Dragline Operator. . . . . Alva W. Bomar
Operator General . . . . . William R. Hamilton
Maintenanceman (Seasonal) LWOP 3/5-3/26/66 . Walter J. Boyd

TEMPORARY PERSONNEL

Laborer (WAE) . . . . . John W. Boyd, Sr.
(2/7 to 5/20/66; 6/15 to 10/31/66)
Laborer (Weekend Naturalist) . . . . . Calvin D. Huffman
(2/12 to 6/3/66; 10/9 to 12/31/66)
Biological Aid . . . . . Thomas E. Toney
(6/13 to 9/2/66)
Biological Technician (EOD 9/19/66). . .Stanley S. Cornelius
Clerk-Typist . . . . . .Mrs. Minnie E. Zachary
(5/17 to 6/17/66)
Clerk-Typist (EOD 8/8/66). . . . . .Mrs. Shirley A. Zeliff

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
SQUAW CREEK NATIONAL WILDLIFE REFUGE
MOUND CITY, MISSOURI

C O N T E N T S

1966

Narrative Report

Squaw Creek National Wildlife Refuge

I. GENERAL

A. Weather Conditions

Table 1. 1966 Weather Rosecrans Memorial Airport, St. Joseph, Missouri

	Precipitation				Max.	Min.
	Month	Normal	Snowfall		Temp.	Temp.
January	0.55	1.20	.5		54	-13
February	0.25	1.09	1.2		64	2
March	0.27	2.33	.4		90	8
April	1.06	3.15	T		85	20
May	1.34	4.36			95	32
June	7.53	5.93			96	46
July	0.98	3.22			100	58
August	4.24	4.21			93	46
September	2.64	3.44			88	26
October	1.16	2.18			87	26
November	0.01	1.68	T		78	13
December	.71	1.36	7.3		63	-5
Totals	20.74	34.18	9.4	Extremes	100	-13

Weather information was obtained through the U.S. Weather Bureau for their station at Rosecrans Memorial Airport, St. Joseph, Missouri - 25 miles southeast of Squaw Creek National Wildlife Refuge.

Precipitation for December 1965 through May 1966 was only 5.28" compared to a normal 13.52". Heavy rains occurred in June but subnormal rains thereafter left a deficit of 13.44" for 1966.

An open winter was experienced in 1966 but January was cold with -13°F registered at St. Joseph but -25°F registered on many local thermometers. The summer was early and hot even by Missouri standards. The autumn was warm and dry.

B. Habitat Conditions

In spite of drought, 1966 was a good year for Squaw Creek Refuge's water, food and cover and waterfowl management.

1. Water

Excessive waters were drained from the refuge in December 1965 and January 1966 to encourage waterfowl to continue their migrations. Winter droughts prevented spring buildups of pools as planned.

Sufficient waters were diverted from Squaw Creek in early summer to control potential weeds in the west pools and in the A-16 moist soil food plant production areas. Natural drying of the Main Pool and timely drawdowns of the west pools and A-16 permitted excellent crops of wild millet, smartweeds and associated moist soil food plants.

Table 2. Impoundment data Main Pool 1966

Month	Average planned	Elevations obtained	Area acres	Acre feet	Remarks
January	850.00	849.40	250	40	
February	850.00	849.90	750	125	
March	851.00	850.10	800	200	
April	851.00	849.80	700	100	
May	850.50	849.00	50	8	
June	849.50	849.86	750	120	
July	849.50*	849.00**	50	8	*Revised plan
August	849.50*	849.00**	0	0	**Dry at gauge
September	850.00*	849.00**	150	25	L.Sl.depressions
October	850.50*	849.00**	400	67	L.Sl.depressions
November	851.00*	849.00**	550	92	Incl. East Bay
December	850.50	849.00**	600	100	Incl. Penny Sl.
Averages	850.29	849.34	421	74	

Sufficient waters were diverted from Squaw Creek and from two deep-well pumps to flood about 1,000 acres of productive marsh during the height of the fall mallard migration, but another thousand acres of choice moist soil food in the Main Pool could not be flooded and remain for the 1967 spring breakup and migrations.

Table 3. Impoundment data Northwest Pool 1966

Month	Average planned	Elevations obtained	Area acres	Acre feet	Remarks
January	853.50	853.75	0	0	Dry
February	853.50	853.50	0	0	Dry
March	855.00	854.40	20	5	In depression
April	856.00	855.34	200	50	In depression
May	856.00	855.20	130	33	In depression
June	856.50	855.48	220	55	Flooded
July	854.50	854.34	20	5	In depression
August	854.50	853.90	10	3	In depression
September	855.00	854.94	100	25	In depression
October	855.50	854.80	60	15	In depression
November	855.70	854.84	60	15	In depression
December	854.00	853.90	10	3	In depression
Averages	854.97	854.53	69	17	

Pump and well #2 were too inefficient to flood the Northwest and West Pools throughout the fall waterfowl migration when Squaw Creek flow was inadequate to supplement the west pools' supply.

Table 4. Impoundment data West and Southwest Pools 1966

Month	Average planned	Elevations obtained	Acre* area	Remarks
January	852.40	852.60	80	Winter drawdown
February	852.50	852.60	80	Winter drawdown
March	854.00	853.80	140	
April	855.00	854.32	180	
May	855.00	854.14	160	
June	855.00	854.76	220	
July	854.50	854.22	170	
August	854.50	853.90	150	
September	854.50	853.90	150	
October	855.00	853.66	120	
November	855.50	853.36	110	
December	854.00	853.60	120	
Averages	854.33	853.74	140	

* Estimated - no elevation - area or capacity curve data available for these pools.

The "North Central Marsh" and Bluff Pool were flooded in June but dried up during the late summer and early autumn. Small ponds were reflooded in the North Central Marsh when duck hunters released their waters into Todd Ditch after December 15th, but Bluff Pool remained dry.

Long Slough and the former rice paddies in A-5 were used to store deep-well Pump #1's water during late summer and as choice waterfowl habitat during autumn. About ten acres of standing corn were flooded in A-3 during the duck hunting season.

Additional water management details have been supplied the Central and Regional Offices by our 1967 Annual Water Program and 1966 Use Data of January 11, 1967.

2. Food and Cover Conditions

Most refuge corn was used by waterfowl during the 1965-66 winter. Some excess corn in A-6 was harvested in early spring.

Winter wheat browse plantings were dormant due to the drought and were not grazed by geese. Drought-resisting Elbon Rye germinated well; remained green all winter and where accessible to geese was heavily grazed. Spring planted oats did not germinate well nor produce browse for waterfowl. Little moist soil plant food was available during the spring waterfowl migration because the drought had drastically lowered the pools and marshes' water levels.

The large supply of invertebrate, apparently produced during the summer in West and Southwest Pools, was especially attractive to immature ducks.

The 1966 winter browse plantings doubled the 1965 plantings and sufficient green browse was available for returning geese. Fall drought, however kept the wheat from remaining green during November and December when geese grazed heavily on 44 acres of Elbon Rye and any other green fodder available.

The German millet grew well but again failed to produce feed apparently due to the drought.

Dense stands of wild millet, smartweeds and associated food plants were available in Long Slough, Northwest Pool, A-16 moist soil food plant areas and the Main Pool but insufficient water prevented much of the Main and Northwest Pools from being used by waterfowl.

Excellent corn crops were again available for wintering waterfowl. This will be shredded as needed for waterfowl and 60 acres will be harvested for trap bait.

Sufficient winter browse remained for winter and early spring. About 100 acres of marginal corn land will be converted to moist soil food plant production in 1967 in attempt to better adjust yields to waterfowl objectives and needs.

Waterfowl use days are our primary indicies for waterfowl refuge management.

Table 5. Waterfowl day use by habitat unit 1966

Habitat Unit	Acres	Water Areas	Goose Days 1965	Goose Days 1966	Duck Days 1965	Duck Days 1966	Waterfowl Use/A.1966
1	870	West pools	5,684,322	2,541,947	6,590,165	4,914,877	8,571
2	880	N.Cent.Marsh	421,343	2,059,999	896,994	685,104	3,119
3	970	Bluff Pool, Paddies & A-3	1,526,498	2,837,392	1,573,851	1,192,940	4,155
4	590	Davis Creek and ponds	529,886	384,853	1,254,400	1,452,094	3,113
5	2,218	S.Long Slough & Main Pool	7,487,182	3,867,129	9,932,067	15,048,949	8,528
6	1,321	N.Long Slough and A-16	720,096	2,180,768	7,095,676	3,170,647	4,051
Total	6,849		16,369,327	13,872,088	27,343,153	26,464,611	5,889*

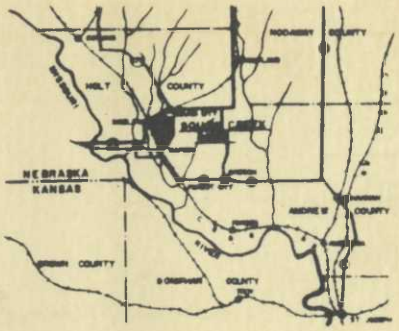
* Average

Table 5 indicates that Habitat Unit #1 (see map #1 p.5) was slightly more attractive on a waterfowl per acre basis than any other unit. Habitat Unit #5, however was nearly as attractive and due to its larger size held the most waterfowl on the refuge. Insufficient water to properly flood the wild millet in the Northwest Pool resulted in less waterfowl use of Habitat Unit #1 during both the spring and fall migrations than expected. Reduced water in the Main Pool allowed Habitat Unit #5 to grow an abundant crop of moist soil food plants and thus attract a phenomenal number of ducks during the fall migration even with insufficient water to flood more than a third of the potential feeding area. Goose use of Habitat #5 decreased due to lack of uncluttered loafing spaces.

Habitat Unit #3 ranked third on an acre basis. Flood waters in its paddies about off set the lack of water in Bluff Pool. Habitat Unit #6 attracted large numbers of waterfowl but due to its extensive spartina area which doesn't attract waterfowl it only ranked 4th on an acre basis. Controlled grazing made some additional wet land prairie attractive to geese in 1966.

Habitat Unit #2 was more attractive than Habitat Unit 4 this year because "North Central Marsh" held open water from February to July and the last half of December 1966 but ponds along Davis Creek in Habitat Unit #4 were low or dry most of the year.

1966 Habitat Units



LOCATION MAP

SCALE

FIFTH PRINCIPAL MERIDIAN

LEGEND

REFUGE BOUNDARY

FENCE LINES

PRIMARY ROADS

SECONDARY ROADS

TRAILS

CANALS & DITCHES

Unit Boundaries 6 5

CONTOUR INTERVAL 5 & 20 FEET

DATUM IS MEAN SEA LEVEL

MOUND CITY

BIGELOW

NAPIER

REFUGE HEADQUARTERS

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

GENERAL MAP

SQUAW CREEK

NATIONAL WILDLIFE REFUGE

HOLT COUNTY

MISSOURI

SCALE

Sufficient food and cover were available to resident wildlife in 1966. Willows and other emergents were too thick in parts of H-2, H-3, H-5 and H-6 for maximum resident wildlife and waterfowl use.

II. WILDLIFE

A. Migratory Birds

A near record of 40,336,700 waterfowl days use was set in 1966 as compared to the record 43,712,470 days use in 1965. A new peak record of 405,690 ducks was set November 12-18, 1966 and a peak 400,000 mallards were counted December 10-16, 1966. Abnormal numbers of shorebirds and rapators were observed during the past year.

Canada geese

An estimated 7,000 large type Canadas used the refuge during early January but these decreased during the late January cold front to 3,075 by February as the winter residents sought relief in warm water ditches and the Missouri River. The Canadas returned to 7,000 in early March before moving on. Three pair set up territories and may have attempted nesting but none succeeded. The large migrant Canadas returned in mid-September and increased the refuge population to 8,000 during December 1966.

An estimated 230 "short necks" Hutchins Canada geese were using the refuge in January 1966 but the subzero freeze pushed them on. A spring flight of fifteen small type Canadas were in early March and these peaked at 160 by the end of the month. One free-flying small Canada stayed over summer. Sixty tiny Canadas of a type known locally as "California Cacklers" and perhaps derived north of the Hudson Strait arrived in mid-September, these peaked at 1,020 in mid-October and slipped away by mid-November, when 500 "shortnecks" returned. Some of these Hutchins lingered through most of December.

White-fronted geese

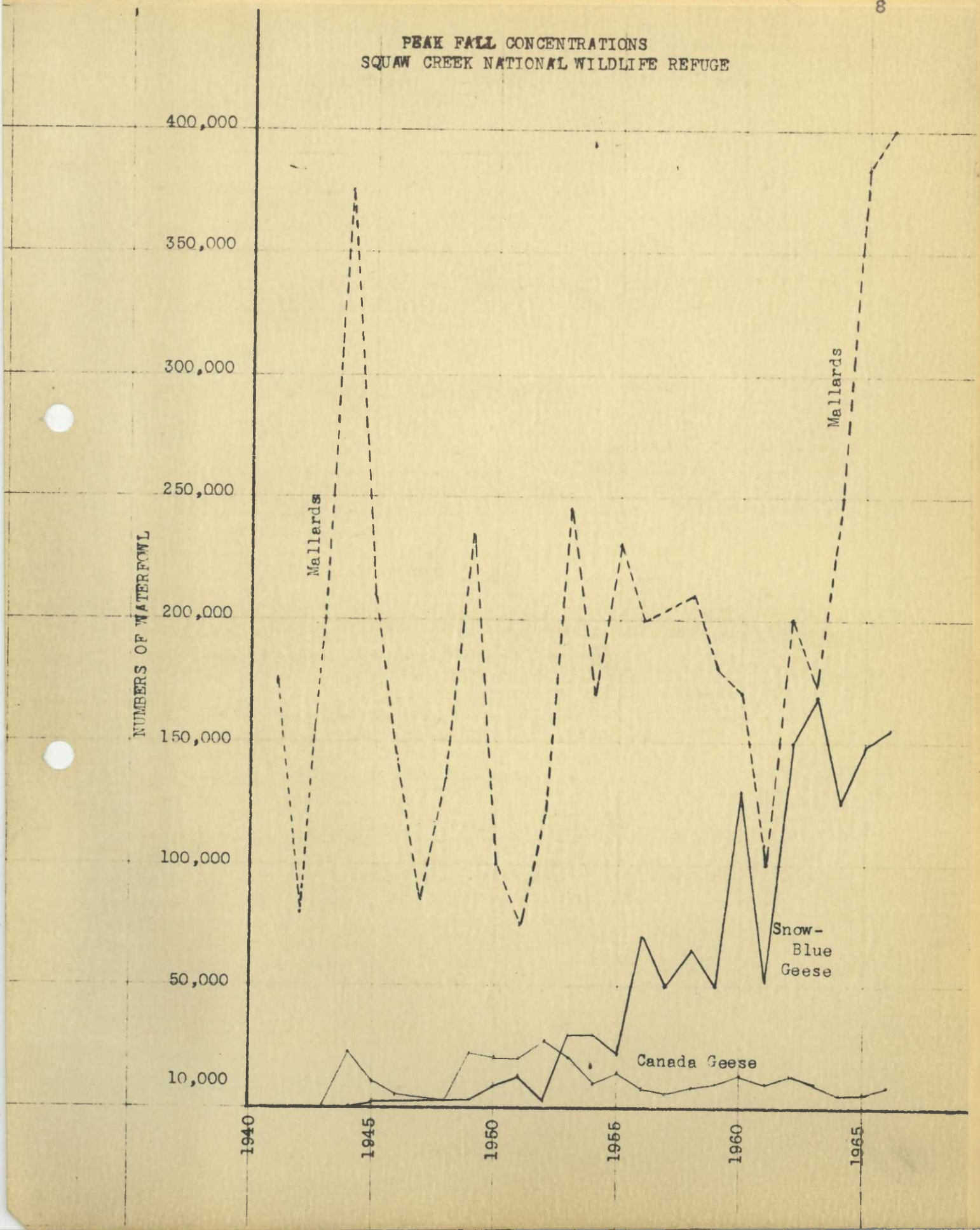
Some of the scattered eastern white-fronted goose population regularly use Squaw Creek in migration. Fifty white-fronted geese were observed on March 4th and a peak population of 2,000 were using the refuge by the third week of March. The last ten of the white-fronts spring migrants were observed the last week of April.

Five white-fronts were observed using the refuge by the third week of September; the fall 200 peak used the refuge October 8-21 and the last four white-fronts were observed the third week of November.

Snow-blue geese

This year started with 45,000 snow and 15,000 blue geese on Squaw Creek National Wildlife Refuge.

PEAK FALL CONCENTRATIONS
SQUAW CREEK NATIONAL WILDLIFE REFUGE



Subzero weather and low refuge waters encouraged these geese to migrate south and only 6,000 snows and 2,000 blues remained from January 22 to February 5, 1966 when the flock built to 14,000 snow and 7,000 blue geese probably from local Missouri River wintering populations. The first apparent blue goose spring migration occurred March 5th when 24,000 snow and 17,000 blue geese used the refuge and built up to 43,000 blue and 38,000 snow geese the following week. The spring peak of 70,000 blue and 70,000 snow geese used the refuge March 19-25. Two snow and three blue geese used the refuge up to July 1, 1966.

The first fall snow geese returned the third week of September when 200 snow and 400 blue geese used the refuge. The geese peaked at 106,700 snows and 51,700 blues in early November and 7,190 snows and 3,910 blues were still using the refuge at the year's end.

Ross's and intermediate lesser snow geese

A small subadult female white goose with a broken wing tip was picked up on March 29, 1966 with several other lesser snow geese where they had collided with a power line near Craig, Missouri. This goose had the following measurements: wing 370 mm. (14½"), culman 45 mm., midtoe 60 mm. and tarsus 77 mm. and compared quite closely to our small white goose we have described and have been handling at least since 1963. Compared to typical lesser snow and Ross's geese this type appeared to be abnormally slim.

An immature Ross's goose was observed several times on the margin of a 20,000 lesser snow goose flock December 3-30, 1966. Two other Ross's geese have been collected here since 1963.

Brant

An adult Atlantic brant was observed at, 200 feet with 20X scope and at fifty feet, feeding in the A-13 wheat field with a party of immature blue geese from October 22 to November 20, 1966. An adult female and an immature male brant were collected from hunters bags here in 1965.

Ducks

An estimated 18,670 ducks used the refuge and an additional 104,000 were scattered in neighboring ponds and depressions as the year began. About 100,000 mallards, 500 black, 40 widgeon, 80 pintail, 40 green-winged teal and 400 common mergansers used the refuge in mid-January. Most of these ducks moved to nearby warm water ditches and rivers during the late January freezeup, but returned to the refuge in early February with 1,200 additional pintails and moved north. The first blue-winged teal, shoveler, wood duck, redhead and lesser scaup were observed in mid-March, but ruddy ducks were not sighted until mid-April.

An estimated 106 mallards, 14 gadwall, 14 widgeon, 20 pintail, 14 green-winged teal, 150 blue-winged teal, 28 shoveler, 40 wood duck, 36 scaup, a ruddy duck and 3 hooded merganser remained on June 1.

Although about 50 pairs of mallard, several pairs of pintail and blue-wings and 20 pairs of wood duck apparently set up nesting territories in this vicinity only five broods of mallards and five broods of wood duck were accounted for on the refuge.

Artificial wood duck houses of diverse designs and material have been furnished at Squaw Creek National Wildlife Refuge since about 1936 but no wood duck nesting use of these had been observed until 1966 when three clutches of eggs were observed in new houses installed at "wood duck pond" in February 1966. Two clutches were found in a converted World War II machine gun case while another was found in a refurbished cypress box. All of the houses used by wood duck were installed over water on metal poles. Additional houses will be supplied the wood duck pond colony in 1967.

Ducks began their late summer buildup from 117 to 720 in mid-August with increases in numbers of pintail, green-winged teal, blue-winged teal and wood ducks. The invasion continued until peak fall populations of 17,500 blue-wings were reached in late September; 5,000 widgeons and 10 redhead occurred in mid-October and 2,750 gadwall, 1,200 shoveler, 220 wood duck, 100 ring-necked, 10 ruddy duck and 10 buffleheads occurred in late October. Peaks of 100 scaup, 340,000 mallard; 31,000 pintail and 31,000 green-winged teal were reached in November.

The pumps were shut off in early December to deliberately reduce open water and thus force the abnormal numbers of ducks south of this winter stress zone. By December 31, 1966 only 670 ducks remained. (See Section V for waterfowl banding and other investigations reporting.)

Other Water and Marsh Birds

Eighteen eared grebes were present May 12-17. The first pied billed grebe was observed March 19th. They peaked at twenty during the spring and 25 during the fall migrations. Four pied bills spent the summer at the refuge and the last two were sighted October 29, 1966.

About 1,000 white pelicans were present during April and 50 were irregularly observed during the summer. The fall peak of 1,200 occurred in late September and the last pelican was observed October 29th.

Twenty double-crested cormorants were first sighted on April 10th, one comorant was sighted April 30th and thirty were observed September 25th.

The first great blue heron was sighted on the refuge on March 30th. Great blue herons are summer residents and peaked at 103 in late August. The last recorded great blues were three on November 17. The first green herons were two sighted on April 23, they peaked at ten during mid-summer and the last green heron was reported September 17th. Five little blue herons were reported July 8; 19 were present July 30-August 6 and the last two were reported September 3.

Two common egrets were present April 13-30. They peaked at 15 about June 1 and the last egrets were reported in mid-October.

Fifteen black-crowned night herons were observed April 17 through most of the summer. The last three black crowns were sighted November 6.

The first yellow-crowned night heron was reported July 8. They peaked at 13 in early September and the last was reported September 24.

Three least bitterns were flushed in Bluff Pool on June 13 when at least five were using the refuge according to their calls. The last least bittern was reported August 5.

An American bittern was observed skulking along Davis Creek February 2 for a very unusual wintering record. Two were occassionally seen during the spring and three were observed in late August. The last bittern was reported October 29, 1966.

A sandhill crane used the refuge March 16-19. A king rail was observed on the refuge on July 9, September 2 and October 1. Ten soras were observed April 24-30. More than the 68 soras were reported present during May and ten still remained October 22. American coot first appeared March 5-11, they peaked at 6000 during the spring migration and a pair spent the summer with us. Their fall migration peak was 3500 and all had departed by late November. Coot spent 172,594 use days on the refuge during 1966.

An influencial critic's contention that low pools were disasterous to wading birds caused us to compare our annual peak population of regularly visiting wading birds to reported water conditions.

In Table 6 a (-) sign indicates low water levels in the Main Pool while (+) indicates normal or high water levels. Population data supplies within parenthesis were interpreted from written descriptions.

Table 6. Wading bird populations 1956-1966

Year	Gr. blue heron	Green heron	L. blue heron	Com. egret	B-C nite heron	Y-C nite heron	Index
- 1956	100	12	0	6	7	0	125
- 1957	100	12	0	6	6	0	124
- + 1958	(100)	200	700	200	200	100	1500
+ 1959	(100)	200	30	200	300	(100)	930
+ 1960	50	17	10	33	200	3	313
+ 1961	(100)	(100)	0	20	5	5	230
+ 1962	65	9	23	52	50	2	201
+ - 1963	202	5	1	16	2	2	228
+ 1964	100	6	55	2	27	6	196
+ 1965	64	6	7	5	11	4	97
- 1966	103	10	19	15	15	13	175
Total	1084	577	845	555	823	235	4119
Averages	99	52	77	50	75	21	374

These data seem to indicate that the numbers of wading birds varied according to their overall habitat rather than only to high or low waters. The 1956-58 droughts apparently produced rank vegetative growths in the pools which in turn produced excellent crops of invertebrates when first flooded in 1958 and 1959. This food supply attracted large numbers of waders.

But when the waters remained high (and turbid) the food plants and invertebrates decreased and so did the herons.

The 1963 low waters was too late to allow a good growth of moist soil plants but did make abnormal numbers of invertebrates available to stabilize the heron populations. The normal and high waters in 1964 and 1965 did not increase the invertebrates because no additional vegetation was flooded so the herons continued to decrease. They held their own during this year's drought and if our theories are correct and the regional heron populations are stable the wading bird numbers should ascend with normal water levels covering the enriched pool bottoms for the next few years.

Shorebirds

A few killdeer and common snipe were winter residents. About 20 killdeer were produced on the refuge and the species peaked at 40 in late October, but all had departed by the end of November. Common snipe peaked at 700 in mid-April and the last ones were observed in late November.

About 200 semipalmated plover used the refuge April 24-May 6. All had departed by October 1. Twenty piping plover were observed April 24-May 6. A single individual was sighted July 19.

A snowy plover used the refuge April 24-May 6. This species is listed as an accidental in Birds of Squaw Creek National Wildlife Refuge RL-155R2, July 1966, yet an individual has been sighted here almost every year since 1962. We have difficulty convincing a local scientific collector that this snowy plover should not be collected on Squaw Creek National Wildlife Refuge but should instead be enjoyed by the hundreds of birders that flock in to see it and to document its occurrence here.

The first American golden plover was recorded April 15, eleven were observed April 24-May 6; they peaked at twelve on their return visit September 24-October 7 and the last one was sighted October 22. Five black-bellied plover were sighted May 27. Fifty used the refuge August 5-12 and the last two were observed by Dr. Cottam on October 22.

Three ruddy turnstone used the refuge July 31-August 6. An upland plover was observed on a refuge fence post on July 20. A long-billed curlew used the refuge April 21-27.

Spotted sandpiper and solitary sandpiper used the refuge May 27-August 14. Spotties peaked at eight and solitarys peaked at six. Ten willet were present April 24-May 6. The last three were sighted June 19. Two greater yellowlegs and ten lesser yellowlegs appeared March 20. The lessers peaked at 120 in April and the greaters peaked at eight in May. The last three greaters and ten lessers were observed by Dr. Cottam on October 22.

Pectoral and Baird's sandpipers were first sighted March 13, but white-rumped sandpipers were not recorded until May 28. Peak numbers were 100 pectoral, 11 Baird's and 1000 white-rumped sandpipers. The last Baird's sandpiper was recorded July 9 and the last "white rump" were ten recorded August 2. Thirty pectorals were recorded October 15.

Five least sandpipers were recorded July 9; they peaked at 120 July 16-22 and four were last recorded August 3.

A flock of 150 short-billed dowitcher appeared May 7. This was their peak number. The last one was observed October 22. Four stilt sandpipers appeared July 8 and 150 were present August 2-9. Twelve were recorded October 1. Five semipalmated plover were reported for September 3-9 and one was reported for October 15.

A marbled godwit was recorded for April 24 and three were reported June 13. Eleven Hudsonian godwit were sighted April 24; sixteen were present May 7-13 and two were reported June 3.

Three American avocet were spot-scoped May 12, they peaked at 8 on their return trip and one was still present October 29. Over 100 Wilson's phalarope were observed April 30; they peaked at 700 May 7-13 and one was recorded September 17.

Gulls and terns

Two herring gull were recorded March 13; they peaked at four March 26-April 1 and two were reported April 30. Twelve ring-billed gull were present January 1; they peaked at 200 March 19-25 and the last 10 were recorded October 15. A Franklin's gull was sighted March 13; they peaked at 10,000 overnight during their fall migration on October 15. Ten Bonaparte's gull visited the refuge April 23-30.

Sixty Forster's tern used the refuge April 29-May 6. The last 10 Forster's were recorded for September 2. A common tern was reported July 4. Two least tern used the refuge July 14-August 26. Seventeen Caspian tern were recorded June 22-28 and the last one was recorded August 15.

Ten black tern were sighted April 29; they peaked at 50 during the summer and the last 40 were recorded September 2.

Doves

A few mourning doves spent the winter in this vicinity. Their numbers increased to about 50 breeding pair and a peak of 2000 doves during the summer. Five doves were reported using the A-3 cornfield on December 31. Wildlife Aid Tom Toney banded 228 during the summer as reported under Investigations.

B. Upland Gamebirds

About 100 ring-necked pheasant and 50 bob-whites wintered through the 1965-66 winter. Production was good due to dry weather so that the populations numbered 200 pheasant and 200 quail at year's end.

C. Big Game Mammals

White-tailed deer were commonly observed on the Squaw Creek Refuge during 1966. Production was good and the drought kept the deer near the refuge for water. We estimated 200 deer were using the refuge before the Missouri any deer hunting seasons. Missouri Department of Conservation estimated 185 deer were harvested in Holt County. Refuge deer dispersed after the hunting decreased competition and effective snows made it possible for the deer to move away from their previous water supply.

D. Fur Bearers, Predators, Rodents and Other Mammals

Form NR-4 for year ending April 30, 1966 indicated 30 opossum, 200 raccoon, 50 mink, 20 striped skunk, 10 red fox, 20 coyote, 10 Franklin ground squirrel, 400 fox squirrel, 50 pocket gophers, 20 beaver, 500 muskrat and 200 cottontail were using the refuge. On November 23, 1966 we submitted the following estimate of furbearer numbers and recommended harvest:

Species	Numbers	Harvest	Share	
			Refuge	Permittee
Opossum	30	Unlimited	None	100%
Beaver	20	Unlimited	None	100%
Muskrat	100	20	50%	50%
Coyote	20	Unlimited	None	100%
Red Fox	10	Unlimited	None	100%
Raccoon	300	Unlimited	None	100%
Mink	60	Unlimited	50%	50%
Striped Skunk	20	Unlimited	None	100%
Cottontails	200	10	None	100%

Dr. Richard Myers, Central Missouri State College, Warrensburg, Missouri continued the college's mammals studies here with an animal ecology class excursion here during the summer and senior student Robert Clement carrying out a special mammal distribution study here during the fall months. Results of these studies will be discussed in Part V.

E. Vultures, Hawks, Eagles, Owls and Crows

Eight turkey vulture used the refuge irregularly from April 23 to August 30. At least one goshawk used the refuge from November 16, 1966 to the Christmas Bird Count on January 2, 1967. Individual sharp-shinned hawk were sighted March 20 and November 10. It is likely others escaped detection. Cooper's hawk are believed to be permanent residents; two were observed March 20 and individuals were sighted October 15 and December 31.

About 20 redtail hawk winter on the refuge and three pair spent the summer here. Two Harlan hawk used the refuge January 1-April 15 and seven were back this December. Two broad-winged hawk probably nested on the refuge in 1966. Two rough-legged hawk spent January 1-March 7 on the refuge. One returned on October 22 and 16 were using the refuge at the year's end.

Four golden eagles were sighted October 10. The first sighting was a golden eagle attacking a recently banded immature snow goose. Five goldens were estimated on the refuge October 15-22, with the last three reported October 22.

Fifteen adult and 40 immature bald eagles were using the refuge on January 1, 1966, they peaked at 123 eagles on February 14 and the last spring eagle was recorded April 15. The first fall sightings were two immatures on October 22. Two adult bald eagles were sighted November 10. The immatures peaked at 79 in early December and the adults peaked at 18 at the year's end.

Four marsh hawks wintered in 1965-66 compared to 38 this current winter. A pair spent the summer with us. A peregrine falcon spent January 13-April 29 on the refuge. A pigeon hawk was reported on March 19 and November 10. Sparrow hawks are year-around residents; four were recorded March 19-September 30 and one was recorded December 17, 1966.

A pair of screech owls are considered permanent residents with the population at times increasing to four. Great horned owls are permanent residents. They peaked at 30. A pair of barred owls continued to nest in a hollow elm tree near the office. This species peaks at about eight. Twenty-five short-eared owls used the refuge last winter and a few had returned by December. A saw-whet owl was recorded for January 1, February 25, November 21 and December 3, 1966.

About 300 crows used the refuge March 1-15. Ten spent the summer here and 43 were using the refuge at year's end.

F. Other Birds

Birds of the Squaw Creek National Wildlife Refuge RL-155R-2 was revised this year to include 253 visitors and 23 stragglers, we were pleased with the marginal illustration showing three snow and two white-bellied blue geese as typical of Squaw Creek's main attraction. RL-155R-2 is Appendix #1. The "Christmas Bird Count" was actually made January 2, 1967 but is included here as a representation of our December birds. Mr. and Mrs. Floyd Lawhon and John Hamilton of St. Joseph, Missouri and Mr. and Mrs. Fitzhugh Diggs of Hamburg, Iowa participated with the manager as compiler. Fifty-three species and over a million birds were counted. Red-winged blackbirds were the most numerous and a goshawk was the most unexpected sighting. A complete account will be published in the April, 1967 Audubon Field Notes.

G. Fish

Most fish were eliminated from the refuge pools during the 1966 drouth. Promiscous fishing was permitted in the Main Pool during May to salvage the stranded carp and buffalo fish. It is unlikely that any game fish survived in the northwest barrow fishery.

H. Reptiles and Amphibians

Snapping turtles were too numerous and too large for good waterfowl refuge management. Turtle attacks were actually observed on a pintail, a mallard and two coot. Painted turtles were commonly observed and leatherbacks were occassionally sighted.

Few massasauga rattlesankes were observed but their presence keeps employees alert and the public on the roads. Garter, milk, blue racer, black, bull and water snakes are commonly observed during the summer.

Bullfrogs, leopard frogs, tree frogs, spring peepers, Rocky Mountain toads and Great Plains toads were commonly observed.

I. Disease

Although there was less lead poisoning in Squaw Creek area waterfowl during the winter of 1965-66 than during the previous winter, lead poisoning was severe at the George Opp Sanctuary in Atchison County, Missouri. Three of five disabled snow geese collected at Opp's showed lead averages of 9 p.p.m. in livers and 26 p.p.m. in tibia.

Reduced duck hunting; reduced duck pond management and our campaign to drain the hunting ponds and move the ducks south are credited with reducing lead poisoning near Squaw Creek Refuge last winter. Our campaign to reduce the post season attractiveness of hunting ponds and moving waterfowl south was even more effective in reducing Squaw Creek disease losses in 1966.

Fowl cholera had not appeared on the refuge since March 1964 but on December 23, 1966 an immature snow goose was found in convulsions suggesting cholera. Dr. Hugh Wallace D.V.M., Mound City, was able to get good cultures and on December 28 diagnosed them as Pasturella sp. The culture plate and slides were forewarded to Dr. H.C. McDougle, School of Veterinary Medicine, University of Missouri, where Pasturella multocida was confirmed. Fowl cholera was also found in two immature snow geese found in January, 1967 in typical head-over-back death postures but an associated Canada goose was found to have been suffering only from lead poisoning (five shots in the gizzard). It is believed that less than twenty waterfowl died of cholera on Squaw Creek Refuge in 1966 and that most of these were immatures that picked this disease up from latent carriers in the flock. A pickup and burn order was issued as soon as fowl cholera was diagnosed. A manuscript by Richard Vaught, Dr. H.C. McDougal and H.H. Burgess on the 1963-64 fowl cholera outbreak is scheduled for early publication in the Journal of Wildlife Management.

Dr. D.O. Trainer and two graduate students from the University of Wisconsin took samples of blood from 21 blue, 43 snow, 15 large type Canada and three small type Canada geese held for them at Squaw Creek National Wildlife Refuge. A letter from Dr. Trainer on September 22, 1966 stated "a small number of serological reactors to Newcastle disease were detected in these birds. Their significances are unknown, in fact the aim of this study is to establish their significance. These same serums are presently being examined for a variety of other viral diseases. You will be notified as the results become available."

Dr. Trainer's students returned this winter for more blood samples but no further results have become available to us from either operation.

Based on processor-derived kill figures an estimated 378 Canada geese, 3,609 lesser snow geese and 3,500 ducks were lost in the Squaw Creek area in 1966 from crippled waterfowl falling into or returning to the refuge. A reduction in this waste would be significant to the hunters and to our future brood stocks.

III. Refuge Development and Maintenance

A. Physical Development and Maintenance

No development funds were available in 1966 to take advantage of prior master planning and optimum working conditions.

Silted portions of Davis Creek were cleaned from the south refuge boundary to the A-2 outlet and through Sections 18 and 7. The spoils were spread into agricultural levees. Brush, debris and spoils from prior cleaning of Davis Creek through the Bale's Estate were put in shape for cultivated crops according to agreement. This task proved rather difficult when the "cooperative land-owner" changed his mind and grew soybeans instead of wheat.

A 300 feet rocked spillway was built by contract in the old Penny Slough across the Main (West) Levee, to relieve Squaw Creek during high floods. About 22 miles of refuge roads were surfaced with crushed rock under a haul and spread contract.

A 40 foot span, 70 ton capacity steel beam-plank bridge designed by Biol. Technician Yocum was built across Squaw Creek by using surplus steel beams and ponderosa pine poles that had been gathered for that purpose during the past several years. Two 27 inch I beams were spaced ten feet apart to carry draglines and other heavy equipment and two 22" I beams were placed six feet apart to carry normal traffic. Ten 80 foot surplus creosoted poles were obtained from a Kirksville, Missouri radar station, sawed in half and hauled by a commercial tractor-grain trailer. The smaller diameter sections were used for piers while the larger sections were custom-sawed for bridge planking and other timbers. (Even the scabs were used for "wakefield piling" on some other jobs.) The outside costs were: driving piling and laying steel by contract $1565; custom sawing $132; transporting I beams $75; transporting poles $288 and 13,020 lbs. of old bridge steel @05¢ or $651 for a total $2711 costs. The refuge staff provided supervision and carpentry work.

This bridge joins two sections of the South Levee, making it possible to patrol and to conduct tours on the refuges' perimeter and to properly manage the southwest portion of the refuge.

The forty acre Andler tract adjoining headquarters was acquired in 1966. Its boundaries were posted and its entries cabled to prevent trespass. Some of the intervening fences were dismantled. The old A-9 boundary fence was replaced with steel posts and four strands of barb wire. Grazing Units 1 and 2 were established with the refuge supplying the fencing materials and the permittee supplying most of the labor.

Considerable efforts were spent husbanding our scanty water supply. Squaw Creek Dam was kept closed most of the year to divert water into the pools.

During the drawdown-growing period Squaw Creek's small water supply was diverted toward Long Slough and the Main Pool. A dike with 24" culvert was built across the A-16 inlet to control its influx.

In early August a diversion ditch was plowed across the southeast corner of the Northwest Pool directly to the West Pool inlet so that Pump #2 could prevent this pool from drying. Old "Rice Paddy" drains were cleaned so that Pump #1 could more efficiently supply the paddies and Long Slough with storage water in mid-August. Both pumps were operated from late August to early December. The Pump #1 - A-3 supply ditch was renovated in late September for use to flood ten acres of corn during the duck hunting season. A short drain with a control culvert was constructed between Long Slough and East Bay.

Squaw Creek was temporarily plugged in early December; flap gates were reversed in A-16 and West Pool and those areas partially flooded. An outlet drain from A-16 to the old Penny Lake Slough was renovated allowing the old slough to flood and attracted thousands of waterfowl to the Main Pool's west bay when not frozen during the winter.

Considerable effort was also spent in 1966 maintaining and repairing the heavy equipment. The wiring system on the TD-18 (obtained surplus in 1965 from U.S. Corps of Engineers) was completely renovated. A tree guard, heat houser and root rake were also built on this unit.

The GMC motor on the Linkbelt Dragline was removed, commercially overhauled and re-installed. The drive chains were also replaced on this unit. The D-7 radiator was removed twice and commercially repaired. The block was replaced, a track was repaired and the maintenance cost continued.

The Austin-Weston grader motor and hydraulic systems were completed overhauled and demanded continuous maintenance. This had been a workhorse for finishing off spoil spreading but we finally had to give her up. We replaced it with the lighter Adams Grader, acquired as surplus from the Defense Department in 1965 after a miscalculated airdrop. It took considerable effort to bend this beaut back into shape, but we had a big road job ahead of us and we did both. The cab from the Austin-Weston fit the Adams well.

The 1946 Ford Courier was sold as were an obsolete welder and considerable scrap iron. Some office furniture and some small equipment were declared surplus and transferred through the State's surplus property agency mostly to local schools.

A mobile crane, a Lilliston rotary mower, steel beams and surplus poles were acquired during the year. Transfer orders were processed for a D-8 tractor at Fort Leonard Wood.

The 1963 Lark, Sedan Delivery has been almost completely overhauled and was set up on overload shock absorbers when its 7" specified clearance started dragging bottom. A surplus 1959 Ford Country Sedan was acquired for use while the Lark was in one shop or another.

A new electric cooking stove was acquired for Quarters #1 to replace the manager's stove which he had been renting from the Bureau these past four years. Some interior painting was accomplished in Quarters 1 and 2. The office and Quarters #1 were given a coat of waicote during the spring.

Insulated doors and windows were installed on the office to reduce heating during the winter and to reduce air-conditioning during our nine month summer.

Wildlife Surveys were made often and reported weekly. A preliminary wildlife census plan was developed and partially put into effect during the year. It became apparent that acquiring the suggested standard data for each category would be more expensive than prior surveys and perhaps too expensive for our current budgets and future programs. The plan will be revised with budgets and future programs in mind.

Considerable effort has been spent in trapping and banding. Some 1965 banding data is included in Table 8. Banding effort - costs, Squaw Creek NWR, to update and document this information. It is apparent that banding geese prior to the hunting season takes the most effort and is the most expensive per bird. Greater efficiency must be used to make this type of banding practical. (Please see Part V for details on banding waterfowl.)

B. Planting

Due to inefficient cooperative farming A-13 was returned to refuge operations. About 22 acres of this fallow unit was planted to oats in March, but dry weather kept the oats from greening until most of the goose migration had passed. The rest of A-13 was reserved for strips of corn and wheat browse.

About 31 acres of A-5 marginal grasslands were renovated with bromegrass, Reed Canary grass and alsike clover seedings.

Refuge personnel planted about 200 acres of corn, 45 acres of German millet, 638 acres of winter wheat browse and 44 acres of Elbon rye during the year.

Table 8. Banding effort - costs Squaw Creek NWR

Banding period	Species	Man hours	Total costs	Cost per bird
1965 pre-season	8 Hutchins' geese			
	181 Lesser snow geese			
	189 Geese	312	$889	$4.71
1965-66 post-season	393 Canada geese			
	952 Lesser snow geese			
	1345 Geese	480	$2,160	$1.61
1966 winter	1117 Mallard			
	8 Black duck			
	3 Baldpate			
	1128 Ducks	320	$1,206	$1.07
1966 pre-season	671 Blue-winged teal			
	15 Green-winged teal			
	19 Wood duck			
	27 Mallard			
	732 Ducks	160	$437	$0.60
1966 fall	43 Hutchins' geese			
	378 Canada geese			
	1083 Lesser snow geese			
	1504 Geese	420	$2,936	$1.82

The corn land was plowed, double disced, planted with 100 lbs. of 8-32-16 fertilizer starter, pre-emergently sprayed with atrazine, cultivated and treated with 100 lbs. of anhydrous ammonia per acre. It was necessary to cultivate corn in 1966 because there was too little soil moisture to activate the atrazine to kill all of the foxtail and other weeds by itself.

Forty bushels of Cargill 340 and ten bushels of DeKalb 633 were planted. Yields averaged about 100 bushels per acre with both varieties on refuge planted units.

Cooperative farmers planted about 490 acres of corn and 149 acres of soybeans. Most of the cooperators' corn were grown under basic agreements whereby the cooperator harvested 60% of the crop and left 40% standing for wildlife. However, in several cases the cooperators chose to take a third of their area share in soybeans.

Soybeans were also grown in A-4 and A-18, where the cooperator harvested early soybeans and planted three acres of wheat browse in the bean stubble for each acre of the refuge's normal share of the soybeans according to another basic agreement.

Due to possible erosion and a shattercane problem, A-2 was on a five year crop rotation whereby the cooperator puts 40% of the corn in refuge cribs (or leaves 50% standing) and takes the remaining corn, small grains and hay. The refuge also received considerable goose browse and all the alfalfa needed by our captive geese from this unit.

Due to the combined efforts 43,575 bushels of corn was left standing on the refuge in addition to normal harvest waste. Some of this appears to be surplus to our expected wildlife needs and will be harvested for other uses.

Our studies indicate that 25,000 bushels of standing refuge corn is optimum for current waterfowl populations. Reductions in corn acres and yields may be proper. We are planning on reducing refuge corn acreage 50 acres by breaking up more fields with strips of browse and to transfer an additional 80 acres of cornland to natural moist soil food plant production.

The refuge harvested 660 bushels of wheat, 150 bushels of Elbon rye, 60 bushels of bromegrass seed and 375 bushels of ear corn during the summer and fall.

The German millet was complete seed failure and occupied space that would otherwise have been used by geese. In 1965 we suspected early frost and this year suspected drought for the lack of seed.

The Elbon rye was a real bonus. It resisted drought, winter killing and grazing geese during 1965-66 to produce 50 bushels of seed per acre. There was such a good demand for the seed from other refuges that we shorted ourselves.

C. Collection and Receipts

In addition to the harvest listed in the above section the refuge combined and cured 1500 lbs. of wild millet and 1500 lbs. of large-seeded smartweed. We purchased three bushels of alsike clover, 34 bushels oats, 50 bushels of seed corn and 500 lbs. of German millet seed. We obtained 660 bushels of seed wheat (and some crushed rock) from Desota National Wildlife Refuge.

We transferred 200 bushels of shelled corn and 20 bushels of Elbon rye seed to Swan Lake N.W.R. We shipped 20 bushels of Elbon rye, 1000 lbs. of wild millet and 200 lbs. of smartweed seed to Crab Orchard N.W.R. We trucked ten bushels of Elbon rye to Desota N.W.R. We shipped 500 lbs. of wild millet and 200 lbs. of smartweed seed to Necedah N.W.R.; 300 lbs. of smartweed seed to Upper Souris and 800 lbs. of smartweed seed to the Calhoun District of Mark Twain N.W.R. Samples of wild millet and smart-weed seed were also shipped to Union Slough N.W.R. for experimental plantings.

Our planned operations indicate that wild millet and smartweed seed will be available here most years. Rough combining is not difficult. Curing this seed is difficult with our current facilities demanding large floor space and a lot of stirring several times a day. This is expensive. Yet we had requests for wild millet for dove baiting (because it was available for transportation costs) and for plantings when the requester had no plans to plant these aquatic seeds in water upon arrival, nor facilities for storing it in cold water. Work by Lee Crail at Swan Lake N.W.R. and Fountain Grove Wildlife Area (Marsh Management in Missouri MCC September 1951) indicates that such seeds must be stored in cold water before planting for successful germination. For these reasons requisitions were closely screened and some were not filled.

D. Control of Vegetation

About 20 man days were spent hand clearing and burning brush from agricultural units and islands. About 55 acres of levees and ditch banks were sprayed with 2-4D and 2-4-5T to control willow, cottonwood and other undesirable vegetation. All 691 acres of corn was treated with pre-emergent atrazine to control foxtail grass and other weeds. Amiben was used on 149 acres to control weeds in soybeans. Dowpon was used on two acres of Southwestern Bell right-of-way to control Johnson grass. These prescribed applications are described in NR-12.

Managed flooding was used on about 400 acres of pools to control emergents during May and June. The bulldozer was used to strip brush from five of the eleven islands in the Main Pool prior to seeding with bromegrass.

E. Planned Burning

The central portion of Burn Unit #1 was successfully burned December 20, 1965. Attempts to complete this burn during early 1966 were unsuccessful due to the moist vegetation and ground.

Unit #8 was successfully burned on March 8, 1966 with a clean burn of the west bay of the Main Pool retarding willow invasions and opening the area to increased waterfowl and shorebird use. The burn in Settling Basin #2 was spotty and needs repeating when conditions permit in 1967 to retard willow growth and clean up debris.

Unit #10 was burned in February and March 1966 along with a completion of the 1965 Unit #7 burn. Unit #5 was successfully burned in August 1966. This retarded an invasion of silky dogwood, willows and other emergents but did not green up for goose browse as hoped due to drought. Mallards were observed loafing on the area during several fall wind storms.

One fallow paddy was burnt over and flooded to produce green browse for appreciative geese.

F. Fires

Several fires escaped from the CB&Q RR, but were quickly put out by their crews, volunteers or by refuge personnel without damage or size to merit formal reporting.

IV Resources Management

A. Grazing

Experimental grazing as a goose browse management practice was initiated. The 40 acre G-1 area was fenced in July with the refuge supplying all of the fencing material and building a quarter mile fence at the north end of the unit. The permittee built four strand barb wire fences on the east and west sides and an electric fence across the south end of the unit. The east and west fences were extended a quarter mile south in October and the electric fence was moved to enclose an 80 acre unit.

About ten acres of rank cordgrass were "gyramored", baled and stacked on the unit for emergency use prior to grazing. Fence rows were gyramored before fencing. These practices not only increased the efficiency of the unit but made them more attractive to geese during the late fall.

The permittee put in 18 cows, 18 calves and 10 yearlings in late July and purposely "overgrazed" the north forty's rank vegetation before extending the range south. The cattle were removed in early November after about 90 AUM's and $90 fees were obtained. Supplementary feeding was necessary during their last month on G-1.

We had planned to relieve pressure on Canada geese by providing additional loafing and feeding space for snow geese. The results were much better than expected, because the Canada geese moved in to loaf and to feed particularly on the rosettes of prickly lettuce and Reed Canary grass shoots that emerged after the concentrated grazing. The experiment might have been even more successful if rainfall had been normal and other vegetation had greened.

B. Haying

Haying permittee Harold Trimmer harvested 36 tons of cordgrass and weeds and 39.8 tons of domestic hay from the refuge during the year and paid the refuge $171.90 for the privilege. Noel Andler also removed 21 tons of wild hay and 27.72 tons of Reed Canary and bromegrass for $107.19.

In all cases the excess vegetation was removed to improve goose pastures. The drought slowed new growth. Much of the wild hay areas were not used for feeding, but those that could be flooded were practically grubbed out by snow geese. Some snow goose loafing on dry extensive mowed areas was also observed. The Reed Canary and bromegrass pastures were moderately grazed by geese.

C. Fur Harvest

Trapper John Boyd harvested 181 muskrats, one mink, one opossum and six raccoon during January 1966, when Permittee Huffman took six muskrats. Herman Preston, Bethany, Missouri, was the high bidder and paid the Bureau $27.50 for 50% of five mink and $131.76 for 40% of 183 muskrat. The mink averaged $11.00 and the muskrats averaged $1.80 each.

Refuge trapper Walter Boyd took 70 muskrats from levees during early March and these were sold to George Plymell, New Hampton, Missouri (at about $1.49 each).

Permit trapper John Boyd harvested ten muskrat, two mink, two opossum, twelve raccoon, a beaver and a coyote during December 1966. These had not been sold by the end of the year.

V Field Investigation and Applied Research

A. Progress Reports

1. Vegetation Surveys

Vegetation Transect #4 across the Main Pool was resurveyed during the summer of 1966 because drought had dried the pool permitting abundant vegetation growth and we had a Wildlife Aid in, U. of Missouri Junior Tom Toney, that was competant to do the job.

Mr. Toney reported that 34% of the total stems were wild millet and 18% were smartweeds as shown in Table 9.

Table 9. Vegetation Transect #4, Main Pool, Squaw Creek National Wildlife Refuge, July 23 - August 2, 1966 - 7290 Feet

Plant	Stems	% of Stems
Millet	1629	34.01
Nodding smartweed	776	16.20
Lovegrass	630	13.36
Butter print	515	10.75
Cat-tail	285	5.95
Salt-meadow grass	178	3.70
Cyperus	147	3.06
Arrowleaf	110	2.29
Spike rush	108	2.25
Pigweed	96	2.00
Soft-stem bulrush	81	1.69
Linderina	61	1.27
Large-seeded smartweed	45	0.93
Lady's thumb smartweed	38	0.79
River bulrush	31	0.64
Foxtail	17	0.35
Tooth-cup	16	0.33
Ammannia	5	0.10
Prickly lettuce	5	0.10
Smartweed #1	4	0.08
Penny cress	3	0.06
Common milkweed	2	0.04
Horseweed	2	0.04
Rose mallow	2	0.04
Ditch stonecrop	1	0.02
Germander	1	0.02
Lambs-quarter	1	0.02
Total	4789 Stems	100.18%

Four 2'x6"x6" seedboxes covered with $\frac{1}{4}$" hardware cloth were placed in representative cover areas along the transect in early August. Seeds were collected, counted and weighed on a weekly basis for a month. Table 10. shows the results of this study.

Table 10. Vegetation Transect #4, Seed Boxes, Main Pool, Squaw Creek National Wildlife Refuge, 1966

Species	No.of Seeds	Wt.in grams	Lbs./ sq.ft.	Lbs./ acre
Nodding smartweed	18,400	33.86	.019	827.64
Large-seed smartweed	206	1.17	.0008	34.85
Millet	6,634	10.33	.0058	252.65
Butterprint	54	.54	.0003	13.07
Pigweed	799	.18	.0001	4.36
Cat-tail	3	Trace		Trace
Cyperus	Trace	Trace		Trace
Unknown #1	5	Trace		Trace
Unknown #2	1	Trace		Trace
Total	26,102			1132.57

Considerable millet and nodding smartweed had scattered before the boxes were set out and much seed still remained on the plants when the boxes were removed so it is extimated that at least a ton of seed food was produced on each acre of the Main Pool in 1966.

2. Wood Duck Studies

Wood duck populations were low but showed some increase over the previous summer. Various types of wood duck houses have been installed at Squaw Creek Refuge since about 1938 but inspectors never found signs of wood ducks using them.

Several types of wood duck houses and locations were tried in a habitat built for wood ducks and called "wood duck pond". A converted aluminum machine gun case and a cypress box were placed vertically over water on aluminum posts. These houses both attracted and produced wood ducks. Another gun case in a similar location but installed similar to Patuxent Research Center's starling resistant houses was not used. A cypress house with a tunnel entrance located in a cottonwood over dry land was taken over by a fox squirrel.

An attempt was made to produce a second clutch in the vertical case but excessive tempatures or infertility caused the hen to desert in July.

We estimated that five broods of wood duck were reared to flight stage on the refuge in 1966. Wood duck roost flight counts were attempted but their concentration never built up to worthwhile census numbers. All of the old wood duck roosts on the refuge were abandoned due to the drought.

Wood duck trapping began in July with the Squaw Creek type swim-in trap. Corn and wheat were used for bait. Mr. Toney trapped 19 wood duck during the summer. A break down of age and sex of banded ducks is included with the teal report.

3. Teal Studies

When teal began to appear in the southwest pool wood duck trap in early August the bait was changed to all wheat and sites in West Pool and the old rice paddies were pre-baited. The southwest pool site was abondoned on August 16 when our attention was concentrated on three traps in West Pool and two traps in the paddies. These traps were operated until the opening of the special teal hunting season.

Table 11. Summer and pre-season banding 1966

Species	Adult		Immature		Local		?	Total
	Male	Female	Male	Female	Male	Female		
Blue-winged teal	28	63	238	337			5	671
Green-winged teal	5	1	6	3				15
Wood duck	6	3	9	1				19
Mallard	4	3	6	6	1	7		27
Total	43	70	260	347	1	7	5	732

Pre-season banding quotas were 100 wood duck and 200 blue-winged teal. The occurrence of "local" blue-wings in the traps were surprising since no broods were otherwise observed here in 1966. Total costs of the pre-season banding was $436.80 or $0.60 per duck.

Hunter performance observations indicated considerable sport was obtained during the special teal season with little harm to the other waterfowl resources in the Squaw Creek area. Opening hunting effort doubled last years but teal were scarce and hunting dropped accordingly. Pickers handled only 281 compared to 440 teals last year. If 3.2 teal were harvested for every teal processed (as was true for all ducks in 1964) then about 900 were bagged. Crippling loss in rank vegetation probably amounted to 20% of the kill and thus the 1966 kill was about 1125 or 635 less teal than during the 1965 special teal season. One hunter was observed taking a shoveler, was apprehended and fined. He is probably now teaching others how to tell shovelers and blue-wings apart.

4. Cooperative Goose Management Studies

The 1965 Progress Report on Goose Management at Squaw Creek National Wildlife Refuge was completed in July 1966 as part of Federal Aid Project No. 13-R-20 - Plan 5 - Job 2. Report on "A Study of Migration and Mortality of Geese in Missouri. About 100 copies of the Squaw Creek portion were removed for Bureau and cooperators reporting purposes. We did not find this approach satisfactory. Separate reports for each study will be submitted in the future.

Band recovery data were analyzed from 603 small type Canada geese banded at Squaw Creek NWR from October 1, 1951 to February 1, 1966 in Table 12. Direct recovery data would suggest that Missouri is the top harvest area for the populations of small Canada geese which use Squaw Creek NWR but indirect returns by removing banding-harvest area bias show that Texas harvest is more critical to these geese.

Table 12. Location of 90 recoveries from 603 small type Canada geese banded at Squaw Creek NWR 10/1/51 - 2/1/66

Location	No.	% of Total	1st. Year Direct	% of Total	Indirects	% of Total
Missouri	40	44.4	33	82.5	7	15.5
Texas	24	26.7	6	13.3	18	40.0
Iowa	5	5.5	3	6.6	2	4.4
Kansas	4	4.4	2	4.4	2	4.4
Oklahoma	4	4.4	1	2.2	3	6.6
Ontario	4	4.4	0		4	8.8
South Dakota	3	3.3	0		3	6.6
North Dakota	2	2.2	0		2	4.4
Quebec	2	2.2	0		2	4.4
South Carolina	1	1.1	0		1	2.2
Manitoba	1	1.1	0		1	2.2
Total	90	100%	45	100%	45	100%

Table 13. Location of 618 band recoveries from 3,907 large-type Canada geese banded at Squaw Creek NWR 1948 - 1964

Location	No.	% of Total	1st. Year Direct	% of Total	Indirects	% of Total
Squaw Creek Area	294	46.6	207	84.5	87	23.3
Swan Lake Area	119	19.3	6	2.4	113	30.3
Other Mo. Areas	4	0.6	0	0	4	1.1
Sub-Total Mo.	(417)	(67.5)	(213)	(86.9)	(204)	54.7
Manitoba	44	7.1	11	4.5	33	8.9
Louisiana	22	3.6	7	3.0	15	4.0
South Dakota	33	5.3	0		33	8.9
Texas	20	3.2	6	2.5	14	3.7
Iowa	22	3.6	1	.4	21	6.0
Nebraska	13	2.1	2	.8	11	3.0
Minnesota	13	2.1	0		13	3.4
Kansas	3	.5	0		3	.8
Saskatchewan	3	.5	0		3	.8
Wisconsin	5	.8	0		5	1.3
Illinois	3	.5	0		3	.8
Arkansas	4	.6	1	.4	3	.8
North Dakota	4	.6	0		4	1.1
Oklahoma	3	.5	2	.8	1	.3
Mississippi	1	.2	0		1	.3
Ontario	2	.4	1	.4	1	.3
N.W. Territories	5	.8	0		5	1.3
Unknown	1	.2	1	.4	0	
Total	618	100.1%	245	100.1%	373	100.4

618 band recoveries from 3,907 large type Canada geese banded at Squaw Creek NWR from 1948 to 1965 are analyzed in Table 13. Although first year direct returns indicate a terrific harvest in the Squaw Creek area, indirect returns indicate that the Swan Lake area harvest is now even more critical to the large type Canada goose populations that also use Squaw Creek Refuge.

Table 14. Location of 442 band recoveries from 3,975 snow geese banded at Squaw Creek NWR 1951 - 1964

Location	No.	% of Total	1st. Year Direct	% of Total	Indirects	% of Total
Squaw Creek Area	92	20.8	76	41.99	16	6.13
Other Mo. Areas	5	1.1	1	.55	4	1.53
Sub-Total Mo.	(97)	(21.9)	(77)	(42.54)	(20)	(7.66)
Manitoba	3	.7	1	.55	2	.66
Ontario	38	8.6	6	3.31	32	12.26
N.W. Territories	13	2.9	1	.55	12	4.60
Saskatchewan						
Minnesota	12	2.7			12	4.60
Iowa	25	5.7	9	4.97	16	6.13
Arkansas	1	.2	1	.55		
Louisiana	16	3.6	8	4.42	8	3.07
Quebec	3	.7	1	.55	2	.77
Illinois	1	.2			1	.38
Wisconsin						
North Dakota	21	4.7			21	8.05
South Dakota	30	7.0			30	11.49
Nebraska	10	2.2			10	3.83
Kansas	10	2.2			10	3.83
Oklahoma	4	.9	1	.55	3	1.15
Texas	156	33.0	76	42.00	80	30.65
Michigan	1	.2			1	.38
New Jersey	1	.2			1	.38
Total	442	97.6	191	99.99	261	100

Recovery data of 442 bands received from 3,975 white-phased lesser snow geese banded at Squaw Creek NWR from 1951 to 1965 are shown in Table 14. Indirect returns indicated that harvests in Texas, Ontario, South Dakota and North Dakota are all more critical to these populations than the kill in Missouri.

358 band recovery data from 2,355 blue-phased geese banded at Squaw Creek NWR from 1951 to 1965 are compiled in Table 15. Indirect returns indicate that kills in Louisiana, Ontario, Texas, Iowa and South Dakota are more critical to these blue geese populations than the Missouri harvests.

Table 15. Location of 358 band recoveries from 2,355 blue geese banded at Squaw Creek NWR 1951-1964

Location	No.	% of Total	1st. Year Direct	% of Total	Indirects	% of Total
Squaw Creek Area	76	21.23	62	46.34	14	6.28
Other Mo. Areas	1	.28			1	.45
Sub-Total Mo.	(77)	(21.51)	(62)	(46.34)	(15)	(6.73)
Manitoba	1	.28			1	.45
Ontario	45	12.57	4	2.99	41	18.39
N.W. Territories	3	.84			3	1.35
Quebec	4	1.12			4	1.79
Minnesota	11	3.07			11	4.93
Iowa	23	6.43	3	2.24	20	8.97
Arkansas						
Louisiana	72	20.11	30	22.42	42	18.83
Mississippi	1	.28			1	.45
Illinois	6	1.68			6	2.69
Wisconsin	2	.56			2	.90
North Dakota	6	1.68			6	2.69
South Dakota	19	5.31	3	2.24	16	7.16
Nebraska	7	1.96	1	.75	6	2.69
Kansas	3	.84			3	1.35
Oklahoma	2	.56			2	.90
Texas	72	20.11	32	23.92	40	17.94
Florida	1	.28			1	.45
Michigan	2	.56			2	.90
Indiana	1	.28			1	.45
Total	358	100.03	135	100.9	223	100.01

The white and blue phase lesser snow geese are separated in these analyses to facilitate identity of the eastern predominately blue and the central artic predominately white populations.

Several conferences between Bureau and Missouri personnel were held during the year to formulate management plans. Ground surveys were made and reported weekly by the refuge staff. Missouri biologists made several aerial counts during the winter and almost every week during the fall. Aerial counts were always supplemented with refuge ground counts to help determine waterfowl composition. Our observations further confirmed that small Canadas generally avoided the aerial count of larger Canada geese by panicing with the blue and snow geese or scurrying away from the Canada goose counting areas.

The 1965 Narrative Report listed the 138 large Canada geese and 128 Hutchins' geese banded after the hunting season and before January 1, 1966. In addition 106 large Canadas, two Hutchins', 184 lesser snow and 104 blue phase snow geese were banded as shown:

Table 16. Post-season goose banding January - March 1966

	Adult		Immature				
Kind	Male	Female	Male	Female	Total	M/100 F	I/Ad.
Canadas	30	40	18	18	106	83	0.51
Hutchins'	1	0	0	1	2	N.S.D.	N.S.D.
Snows	18	14	73	79	184	98	4.75
Blues	10	8	47	39	104	121	1.41

The abnormal rate of immatures per adults snow geese we believe was caused by detached goslins forming gangs and surviving on our bait sites during periods of ineffective adult leadership for feeding flights off the refuge. The age ratio of 345 white phase geese banded during the 1965 hunting season was 1.5 immatures per adult.

Table 17. Composition of fall-banded waterfowl October - December 1966

	Adult		Immature				
Kind	Male	Female	Male	Female	Total	M/100 F	I/Ad.
Large Canada	120	109	74	75	378	105	.65
Small Canada	8	10	11	14	43	79	1.39
Snows	135	132	224	226	717	100	1.67
Blues	67	85	111	103	366	95	1.41

Combination of 1966 fall goose peaks are shown in Table 18 because we thought this breakdown useful in analyzing our goose study.

Table 18. Peak fall geese populations Squaw Creek NWR 1966

Date	Canadas Large	Canadas Small	Snow Geese White	Snow Geese Blue	W.F.	Brant	Ross'
10/15-21	1,060	1,020(1)	100,000	50,000	200	0	0
11/5-11	5,260(3)	240	106,700	51,700	10	1	0
11/12-18	7,700(4)	500(2)	68,700	33,500	4	1	0
12/10-16	8,000	20	74,000	26,200	0	0	1

(1) Mostly tiny eastern artic hutchinsii. (2) Mostly "shortnecks" - typical hutchinsii. (3) Peak Canada goose hunting season population. (4) Peak fall-winter numbers. Significant peak numbers are also underlined.

Over-harvesting of Squaw Creek area Canada geese led to a 30 day hunting season and a one Canada goose bag limit in 1964. High operating costs and hazards associated with highway check stations led to compulsory registration of Canada geese in the Squaw Creek area in 1965. These regulations continued in 1966 and compliance improved. Checking stations were operated by Bureau or State personnel at Bigelow, the refuge headquarters and at Forest City. Private cooperators operated check stations at RockPort and Maryville.

The registered Canada goose harvest is shown by stations in Table 19.

Table 19. Squaw Creek area Canada goose registered harvest 10/20-11/18/66

Date	Bigelow		Forest City		Headquarters		Total	
	Large	Small	Large	Small	Large	Small	Large	Small
T 20	21	44	9	32	27	12	57	88
F 21	5	29	0	6	0	5	5	40
S 22	10	11	3	15	2	2	15	28
S 23	3	12	1	7	2	1	6	20
M 24	2	1	0	0	0	2	2	3
T 25	7	7	1	1	5	0	13	8
W 26	5	3	2	0	3	2	10	5
1st. wk.	53	107	16	61	39	24	108	192
T 27	1	0	1	0	7	0	9	0
F 28	7	2	1	2	5	2	13	6
S 29	19	7	7	0	19	1	45	8
S 30	16	3	14	0	13	1	43	4
M 31	9	0	2	1	10	0	21	1
T 1	23	1	12	0	20	0	55	1
W 2	13	0	3	1	2	0	18	1
2nd. wk.	88	13	40	4	76	4	204	21
T 3	20	0	3	0	8	0	31	0
F 4	14	0	0	0	9	0	23	0
S 5	19	2	7	1	7	0	33	3
S 6	8	3	8	0	7	0	23	3
M 7	4	0	0	0	3	0	7	0
T 8	12	2	6	1	6	0	24	3
W 9	17	2	2	0	25	0	44	2
3rd. wk.	94	9	26	2	65	0	185	11
T 10	7	0	1	0	4	0	12	0
F 11	5	0	1	0	1	0	7	0
S 12	5	5	1	0	5	0	11	5
S 13	9	3	1	0	1	0	11	3
M 14	2	0	0	0	3	0	5	0
T 15	3	1	1	0	0	0	4	1
W 16	5	1	1	0	2	0	8	1
T 17	7	0	1	0	4	0	12	0
F 18	5	3	3	0	2	0	10	3
Last Pd.	48	13	10	0	22	0	80	13
Totals	283	142	92	67	202	28	577	237
RockPort (season report)							8	4
Maryville (season report)							4	0
Total harvested registered							589	241

Compliance was rated: first week 80%, second week 85%, third week 90% and fourth period 85% based on local observations and enforcement reports. Table 20 shows this relationship to actual harvest and composition.

Table 20. Registered kill of Canada geese

Date	Compliance	Large Canadas Reg.	Large Canadas Adj.	Small Canadas Reg.	Small Canadas Adj.	Totals Reg.	Totals Adj.
10/20-26	80%	108	135	192	240	300	375
10/27-11/2	85%	204	240	21	25	225	265
11/3-9/66	90%	185	206	11	12	196	218
11/10-18	85%	80	94	13	15	93	109
Maryville and RockPort	84%	12	14	4	5	16	19
Hunter Harvest		589	689	241	297	830	986
Crippling loss	20% of kill		172		74		246
Total Kill			861		371		1,232

The actual harvest totals 986 and with an estimated 20% hunting-connected (crippling) loss, resulted in a total kill of 1,232 Canada geese (102 less than calculated for 1965).

This kill represents about 15% of the 11/12-18/66 combined hunting season Canada goose peak of 7,700 large and 500 small Canada geese. If the kill is added to this peak it is only 13% of the potential 9,432 peak Canada goose concentration. It is apparent that our special regulations have been successful in reducing the overall Canada goose kill to an allowable level in the Squaw Creek area. These regulations appear more effecient when the large Canada geese are studied separately. Table 20 indicates that large Canada geese represented only 70% of the kill; 11% of the 8,000 peak and 9.7% of the potential 8,861 large type Canada goose wintering population.

It seems however, that the relatively early (October 20, 1965 and 1966) goose hunting openings may be especially hard on the tiny eastern artic Canadas that use Squaw Creek. It appears that 240 were harvested the first week and that 371 small Canadas (30% of total) were killed during the 1966 hunting season. This kill represents 36.4% of their 1,020 peak population and 27% of their 1966 potential 1,391 peak. Unfortunately we know so little about the distribution of this tiny goose that these data are insignificant at this time.

Dr. Harold Hanson's classification of heads, tails and wings of 247 Canada geese collected from five processors gives a good idea of the composition of the 1966 Canada goose harvest.

Table 21. Hanson's classification of Canada goose parts

	Large Canadas			Small Canadas		
Age	Western Prairie	Todd's	Giants	Hutchins'	E. Artic	Total
Immatures	117	11	1	7	26	162
Adults	41	8	2	4	30	85
Total	158	19	3	11	56	247
% of Total	64	7.7	1.2	4.4	22.7	100

Table 21 indicates that 27% of the Canada geese dressed in processing plants were "small Canadas". A similar trend appeared in 1965 when 27% of the registration and 26% of the processed Canada geese were the small types. Hanson found only 1.2% of the processed Canadas were giants. This extremely low figure compared to earlier classifications was developed through recent changes in Dr. Hanson's concept of Branta c. maxima in that he now considers the "northern smaller giants" a distince race tentatively labelled as subarticus, which we call western prairie. Western prairie Canadas made up 64% of the processed geese.

The number of giant Canadas showing up at the processors are further reduced by hunter's saving them for trophies and by the traditional late arrival of a significant portion of this flock.

We are giving considerable thought to the indirect inter-relations of the Squaw Creek and Swan Lake Canada goose flocks and will include this study in our 1966 Progress Report.

The number of waterfowl processed in five sampled plants in 1966 compared to the ratios of bagged to processed waterfowl worked out by intensive surveys in 1964 indicated the following harvest and kills:

Table 22. 1966 Waterfowl kills based on numbers processed

Kinds	Processed	Factor	Harvest	Crippled	Total kill
Canadas	291	5.20	1,513	378	1,891
Snows & Blues	1,765	8.18	14,437	3,609	18,046
White-fronts	1	11.00	11	3	14
Mallards	3,553	3.2	11,370	2,843	14,213
All Ducks	4,374	3.2	13,997	3,499	17,496

The 1,891 Canada goose kill estimated by the processors' ratio indicates that the 1,232 estimated from compulsory check stations is not too high. It is believed that due to the early goose hunting seasons in 1965 and 1966 a slightly higher portion of Canada geese were processed to prevent spoilage than in the later 1964 season.

Using the compulsory check stations estimates the correction factor would be a Canada goose processed for 4.21 killed in 1965 and for 4.23 killed in 1966. It is believed that the long (70 day) hunting season for lesser snow geese would nullify any change in ratio due to an earlier season.

Attempts to make field appraisals of lesser snow geese production during their pause at Squaw Creek National Wildlife Refuge were thwarted many times by the arrivals, milling, mixing and departures of several distinct populations, as happened at our wild goose workshop.

We noted on several occassions that two distinct populations appeared to be using the same water area. The ratio of blue geese increased when a large proportion of this concentration was ranging off the refuge to feed, suggesting that eastern populations were feeding in and close to refuge marshes while the predominately white phase more central oriented flocks were typical long range field feeders. Summaries of these surveys are given in Table 23.

Table 23. Field appraisals of lesser snow geese families

Date	White		Blue		Mixed		White: Blue	Population Observed
	A	I	A	I	A	I		
10/8/66	1	1.52	1	1.05	1	1.04	4:1	30,000
10/14/66	1	1.22	1	0.75	1	2.50	2:1	100,000
12/23/66	1	1.13	1	0.92	1	1.10	1:2	20,000

5. Cooperative Studies With CMSC

Dr. Richard F. Myers, Assoc. Professor of Zoology, Central Missouri State College, Warrensburg, Missouri has continued his interest by participating in the Missouri Chapter Wildlife Society tours and demonstrations here in April, directing a zoological excursion of Squaw Creek National Wildlife Refuge in July and supervising the mammal distribution studies of his senior student Bob Clement during the past fall and winter. The study has resulted in several new specimens in our museum's small mammal collection and several mammals added to our mammal checklist.

Dr. Myers has explored the possibilities of his student studying the snow-blue goose complex and other problems here and is waiting Bureau decisions on applied research priorities before proceeding.

6. Cooperative Small White Goose Study

We have assisted David Trauger and Dr. Paul Vohs, Iowa State University in collecting information on Ross' and other small white geese occurances in the Central and Mississippi Flyways. Blood tests by Dr. Vohs have indicated that the small white goose first described at Squaw Creek NWR in 1964 is in fact a separate unity than Ross' or lesser snow geese.

7. Waterfowl Inventory Study

A preliminary wildlife inventory plan was prepared in July 1966. It was recently scrutinized by Area Biologist James Monnie and returned for suggested changes and additional details.

Observations were directed toward studying responses of different waterfowl to aerial and other census techniques. Insufficient time is available to gather significant data for improving techniques to the standards required by our current management plans.

8. Winter Mallard Banding

Our post season mallard quota is 2,000. From January to March 1966 the following ducks were banded:

Table 24. Ducks banded January - March 1966

Species	Males	Females	Totals	M/100 F
Mallard	793	324	1,117	248
Black duck	7	1	8	700
Baldpate	2	1	3	200
Totals	802	326	1,128	246 (Ave.)

Banding quotas of winter mallards, and blue-winged teal are made for the Migratory Bird Population Station studies with no further analysis made or proposed at this station.

9. Mourning Dove Banding

Our mourning dove quota was set at 100. We had never banded more than ten free flying doves up to this year. Tom Toney started trapping July 23 and by the end of the summer had 23 traps in operation. Twenty-one traps were conventional funnel traps and two were string-activated door traps. Wheat and some oats were used for bait.

Table 25. Doves banded July - August 1966

Species	Male	Adult Female	Unknown	Immature	Total
Mourning dove	99	27	2	100	228

VI Public Relations

A. Recreation Use

The public used Squaw Creek National Wildlife Refuge 12,920 times for 2,694 "converted visitor days" in 1966. This compares to 16,180 times and 4,518 days in 1965. The 1966 Public Use Conversion Factors Report was submitted on January 10, 1967.

We attribute the decreased use to the "entrance fee designation" and the lack of open water for sightseers. We do not believe that the "entrance fee designation" could have been poorer timed. Our big attractions are the spring and fall waterfowl migrations. The northward migrations were almost completed by May 30 and the southward movement had not really gotten underway by September 5, 1966. Our "recreation areas" are so underdeveloped that they serve as utility areas in the summer rather than attractions.

We had little to offer, so the fee signs posted on our gates kept out the local and casual visitor even though we practiced the "soft sell".

We are not concerned however that the productive marshes appeal less to the sightseers and fishermen than to waterfowl since our primary concern is still attracting ducks. In fact fishing use would have been less had it not been for the fishermen that took advantage of the indiscriminate harvest before the Main Pool dried up.

B. Official Visitors

A list of official visitors has been sorted out of our visitor register by Mr. Yocum and follows:

1/10 Richard Vaught, M.D.C., Columbia, Missouri
1/10 Ralph Hibdon[illegible], M.D.C., Jefferson City, Missouri
1/11 Walter Sclokes, U.S.G.S., Water Resource Dept., Rolla, Missouri
1/11 Harry E. Stiles, Refuges, U.S.B.S.F.W., Minneapolis, Minnesota
1/11 Mr. and Mrs. John Hamilton, St. Joseph, Missouri
1/11 Hollis D. Crawford, M.D.C., Cameron, Missouri
1/19 Fred Veatch, M.D.C., Kirksville, Missouri
1/19 Paul Johnson, M.D.C., Supervisor, St. Joseph, Missouri
1/22 John A. Hague, U.S.G.M.A., St. Joseph, Missouri
1/29 Clif Tozier, Leawood, Kansas
1/30 Mr. and Mrs. Fitzhugh Diggs, Hamburg, Iowa
1/30 Mrs. E.K. Griffith, Mound City, Missouri
1/30 Floyd Lawhon, St. Joseph, Missouri
1/30 Robert Brown, Sr., St. Joseph, Missouri
1/30 Roy Sims, Editor, Mound City, Missouri
1/30 Dr. J. Bruce McRae, C of C, Mound City, Missouri
1/30 David R. Humpherys, U.S.G.S., Boise, Idaho
1/30 Leo Emmett, U.S.G.S., Rolla, Missouri
1/30 Jerry Fedy, U.S.G.S., Joplin, Missouri
1/30 Joe Richardson, U.S.G.S., Rolla, Missouri

2/16	Jan Clifton, M.D.C., Mound City, Missouri
2/18	Kent Olson, U.S.B.S.F.W., AAO, Huron, South Dakota
3/10	Loren J. Bonde, U.S.G.M.A., Lincoln, Nebraska
3/13	Dr. Howard Forsythe, Pentagon Club, Kansas City, Kansas
3/15	Robert W. Arrowsmith, Necedah NWR, Necedah, Wisconsin
3/16	Walter S. Oakes, U.S.G.S., WRD, Rolla, Missouri
3/19	Dr. David F. Parmelee and Ornithology Class, KSTC, Emporia, Kansas
3/20	David Easterla and class, N.W.M.S.C., Maryville, Missouri
3/20	Ron and Martha Andrews, I.S.U., Ames, Iowa
3/20	Frank J. Ligas, Nat'l. Audubon Society, Taverner, Florida
3/20	Robert Schafer, B.S.A., Maryville, Missouri
3/23-25	John Lynch, U.S.B.S.F.W., Lafayette, Louisiana
3/25	Mr. and Mrs. Jack Wallace, M.D.C., Brookfield, Missouri
3/25	Donald M. Christisen, M.D.C., Columbia, Missouri
3/25	Norman Dey, N.R.P.& G., Lincoln, Nebraska
3/25	George Schildman, N.F.P. & G., Lincoln, Nebraska
3/25	Gary Drown, N.F.P.& G., Plattsmouth, Nebraska
3/25	Earl Coleman, M.D.C., Jefferson City, Missouri
3/25	M.K. and Ruth Chapman, M.D.C., Clinton, Missouri
3/25	Harold V. Terrill, M.D.C., Ashland, Missouri
3/25	O. Fred Veach, M.D.C., Kirksville, Missouri
3/25	Yuell L. Wells, M.D.C., Schell City, Missouri
3/25	Kenneth Sadler, M.D.C., Columbia, Missouri
3/25	Robert H. Timmerman, Swan Lake NWR, Sumner, Missouri
3/25	Lee P. Burgess, Jr., M.U., Columbia, Missouri
3/25	John A. Hague, U.S.G.M.A., St. Joseph, Missouri
3/25	Robert L. Dunkeson, M.D.C., Jefferson City, Missouri
3/25	David and Kathy Trauger, I.S.U., Ames, Iowa
3/25	Dr. Richard F. Myers and students, C.M.S.C., Warrensburg, Missouri
3/25	Glen McCloud, M.D.C., Rock Port, Missouri
3/25	Paul B. Johnson, M.D.C., St. Joseph, Missouri
3/25	Hollis D. Crawford, M.D.C., Cameron, Missouri
3/25	Lyle A. Stemmerman, Flint Hills NWR, Burlington, Kansas
3/25	Leroy J. Korschgen, M.D.C., Columbia, Missouri
3/25	Bob McWhorter, K.F.& G., Manhattan, Kansas
3/25	Dick Hager, Kansas Fish & Game, Straus, Kansas
3/25	Marvin D. Schwilling, Kansas Fish & Game, Great Bend, Kansas
3/25	Bob Barrat, I.C.C., Des Moines, Iowa
3/25	Charlie Blanchard, M.D.C., Trimble, Missouri
3/25	Ted Shanks, M.D.C., Jefferson City, Missouri
3/30	Verne and Bonnie Broyles, U.S.G.M.A., Topeka, Kansas
4/3	Leo S. Lance, State Probation Officer, St. Joseph, Missouri
4/4	R. David Purinton, U.S.G.M.A., Rochester, Minnesota
4/14	Judge John G. Bowes, Oregon, Missouri
4/21	Lyle A. Stemmerman, Flint Hills NWR, Burlington, Kansas
4/22	Dr. K.W. Minter and class, N.W.M.S.C., Maryville, Missouri
4/26	Mrs. Viets and 30 students, Rulo, Nebraska
4/27-5/1	Mr. and Mrs. Harry Gregory, C.M.S.C., Warrensburg, Missouri
5/4	Cleo Simmons, Mo. Hiway Dept., Mound City, Missouri
5/5	Eva Nicholos and fourth grade, Minnie Cline School, Savannah, Missouri
5/9	George Darland, Engineer Branch, Minneapolis, Minnesota
5/9	Robert P. Kist, Engineer Branch, Minneapolis, Minnesota

5/9	Mrs. Gary Maudlin and Biology Class, Grant City, Missouri
5/14	Steven Hilty, C.M.S.C., Warrensburg, Missouri
5/21	Inger Lassen, Snaoya, Norway
5/21	Eric Prather, K.S.T.C., Emporia, Kansas
5/22	E.N. Obert, S.U.I., Iowa City, Iowa
6/8	Mike Milonski, M.D.C., Jefferson City, Missouri
6/8	Paul Johnson, M.D.C., St. Joseph, Missouri
6/11	Tom Toney, Piedmont, Missouri
6/15	Mrs. Hazel Lark and 25 pre-schoolers, Oregon, Missouri
6/19	Glen Geyer, Turtle Trapper, Waterville, Minnesota
6/19	Don Norwet, M.D.C., St. Charles, Missouri
6/9	John L. Boyles, M.D.C., Sumner, Missouri
6/9	Robert W. Kemp, M.D.C., St. Joseph, Missouri
6/25-26	Clair T. Rollings, Refuges, U.S.B.S.F.W., Minneapolis, Minnesota
6/25	Dr. Paul A. Vohs, I.S.C., Ames, Iowa
6/26	Simon Rositzky, Audubon Society, St. Joseph, Missouri
6/27	Dr. Kenneth W. Minter and class, N.W.M.S.C., Maryville, Missouri
6/27	Hollis D. Crawford, M.D.C., Cameron, Missouri
7/2	Lee P. Burgess, Jr., M.U., Columbia, Missouri
7/8	Dr. Richard F. Myers, Biology Field Trip, C.M.S.C., Warrensburg, Mo.
7/13	Paul M. Robinette, Missouri Outdoor Recreation Survey
7/21	Jay Gore, Tenn. Game & Fish Comm., Ashland, Tennessee
7/25	Howard E. Christian, Corps of Engineers, Omaha, Nebraska
7/25	Lowell P. Powell, Corps of Engineers, Omaha, Nebraska
7/25	Bill Evans, Corps of Engineers, Omaha, Nebraska
7/25	Allen C. Hoefelman, M.D.C., Jefferson City, Missouri
7/25	Mike Milonski, M.D.C., Jefferson City, Missouri
7/25	O. Fred Vloch, M.D.C., Kirksville, Missouri
7/25	Robert Dunkeson, M.D.C., Jefferson City, Missouri
8/11	B.N. Howerton, Swan Lake NWR, Sumner, Missouri
8/16	E.F. Ceglenski, Supt. of Schools, Mound City, Missouri
8/23-24	Herb Dill, Refuges, U.S.B.S.F.W., Minneapolis, Minnesota
8/23-24	Harry E. Stiles, Refuges, U.S.B.S.F.W., Minneapolis, Minnesota
8/23-24	Dr. William Green, U.S.B.S.F.W., Winona, Minnesota
8/23-24	Kermit Dybsetter, Desoto NWR, Missouri Valley, Iowa
8/23-24	Robert Timmerman, Swan Lake NWR, Sumner, Missouri
8/23-24	James Monnie, Area Biologist, Quincy, Illinois
8/23	R.L. Dunkerson, M.D.C., Jefferson City, Missouri
8/23	William Stephenson, M.D.C., Jefferson City, Missouri
8/23	Ralph Hibdon, M.D.C., Jefferson City, Missouri
8/23	Glen McCloud, M.D.C., Rock Port, Missouri
8/23	Jan Clifton, M.D.C., Mound City, Missouri
8/23	Paul Johnson, M.D.C., St. Joseph, Missouri
9/2	Ron and Martha Andrews, I.S.U., Ames, Iowa
9/4	Lee P. Burgess, Jr., M.U., Columbia, Missouri
9/14	Ralph G. Hayden, U.S.D.A., PPC, Sikeston, Missouri
9/16	Robert H. Wheeler, U.S.G.M.A., North Platte, Nebraska
9/17	James Ryan, M.D.C., Albany, Missouri
9/20	Dudley Alexander, Trust Officer Bales Estate, Kansas City, Mo.
9/20	Walter Gonce, Trust Officer Bales Estate, Kansas City, Missouri

9/22 Hollis D. Crawford, M.D.C., Cameron, Missouri
10/6 Gladys March and 105 students, 12 teachers and parents Avenue City, Missouri School
10/7 Karl Slagel, M.D.C., Columbia, Missouri
10/11 Jimmy Robertson, St. Joseph, Missouri
10/12-14 Merle O. Bennett, Kirwin NWR, Kirwin, Kansas
10/13-14 Wayne E. Sanders, U.S.G.M.A., Jefferson City, Missouri
10/13-15 Dennis F. Holland, Holla Bend NWR, Russellville, Arkansas
10/13-14 Gerald L. Clawson, Desota NWR, Missouri Valley, Iowa
10/13-14 Verne L. Broyles, U.S.G.M.A., Topeka, Kansas
10/13-16 John Lynch, Research, U.S.B.S.F.W., Lafayette, Louisiana
10/13 H.W. McGebe and Ecology Class, Tarkio College, Tarkio, Missouri
10/14 Thomas E. Toney, M.U., Columbia, Missouri
10/14 Dr. Paul Johnsgard, U. of Nebr., Lincoln, Nebraska
10/14-16 Dr. William Elder, M.U., Columbia, Missouri
10/14 Dr. Harvey L. Gunderson, U. of Nebr., Lincoln, Nebraska
10/14 Ron Andrews, I.S.U., Ames, Iowa
10/14-15 Rodney Green, C.M.S.C., Warrensburg, Missouri
10/14-15 Dr. Richard F. Myers, C.M.S.C., Warrensburg, Missouri
10/17 Floyd Tillotson and 34 students, Morrill, Kansas
10/20 Roy Tamilson, M.D.C., St. Joseph, Missouri
10/20 Jim Ryan, M.D.C., Albany, Missouri
10/22 Paul E. Ticknor, M.D.C., Platte City, Missouri
10/26 John Godart, M.D.C., Cameron, Missouri
10/26 Burton S. Webster, Noxubee NWR, Brooksville, Mississippi
10/28 Ed Law, Noxubee NWR, Brooksville, Mississippi
11/2 William A. Harper, B.S.A., St. Joseph, Missouri
11/7 Richard Nolf, St. Joseph Museum, St. Joseph, Missouri
11/10 Don Woolridge, M.D.C., Jefferson City, Missouri
11/11-13 Bill Crawford, M.D.C., Columbia, Missouri
11/11-13 Buck Caldwell, M.D.C., Columbia, Missouri
11/12 John Gottschalk, Director, U.S.B.S.F.W., Washington, D.C.
11/15-16 Elwood Martin, Patuxent Research Center, Laurel, Maryland
11/18 Bonar D. Law, U.S.G.M.A., Mitchell, South Dakota
11/20 David H. Swendson, U.S.G.M.A., Fergus Falls, Minnesota
11/21 Nancy Weisshaar and 57 students, Horace Mann School, Maryville, Mo.
11/25 Dr. Harvey L. Gunderson, U. of Nebr., Lincoln, Nebraska
11/25 Roger D. Beers, K.S.T.C., Emporia, Kansas
11/27 Ralph V. Vosslingh, U. of Wisc., Madison, Wisconsin
11/27 Steven F. Palmer, U. of Wisc., Madison, Wisconsin
11/27 Jacki and Mill Friend, U. of Wisc., Madison, Wisconsin
11/29 Dr. Richard F. Myers, C.M.S.C., Warrensburg, Missouri
11/29 Donald E. Johnson (Equal Opportunity) Minneapolis, Minnesota
12/3 Jim Robinson, U.S.G.M.A., Hutchinson, Kansas
12/3 Verne Broyles, U.S.G.M.A., Topeka, Kansas
12/10 Keith Lambertsen and 17 sixth graders, Maitland, Missouri
12/12 Mick Gray, NCC, Nebraska City, Nebraska
12/12 Ray Franzen, NCC, Falls City, Nebraska
12/14 John D. Umberger, Engineering, U.S.B.S.F.W., Minneapolis, Minn.
12/14 Harry E. Stiles, Refuges, U.S.B.S.F.W., Minneapolis, Minnesota
12/14 John A. Hague, U.S.G.M.A., St. Joseph, Missouri
12/18 Verne Broyles, U.S.G.M.A., Topeka, Kansas

C. Refuge Participation

Squaw Creek National Wildlife Refuge personnel were quite active with public relations in 1966. Biological Technician Yocum continued as Pack 71 Cubmaster; Operator General Hamilton continued as Troop 71 Scoutmaster until autumn when he relieved the Manager of the Neighborhood Commissioner position. Laborer (Naturalist) Huffman was Explorer Post 71 Advisor with Refuge Manager Burgess as assistant and Maintenanceman Walter Boyd as Chairman, Explorer Committee.

Mesdames Burgess, Yocum and Zeliff were active in the girl scout movement and involved their husbands in that program from time to time.

Mr. Burgess belongs to the local Kiwanis Club and Mr. Yocum is active with the local PTA.

Messrs. Huffman, Yocum and Burgess are all members of the Missouri Chapter of the Wildlife Society. The manager served as program chairman for the chapter's spring meeting and tours of northwest Missouri. He is active with the snow-blue and white-fronted geese committee of the Mississippi Flyway Technical Section. All staff members assisted with one phase or another of John Lynch's Wild Geese Appraisal, October 13-16.

The refuge staff has prepared 25 "Squaw Creek Digests" for 28 news outlets during the year. Squaw Creek has been featured several times in Floyd Lawhon's Museum Graphic articles. Jim Keefe and Don Wooldridge prepared a center spread photo story "Duck Stopper" for the January 1967 issue of Missouri Conservationist. (Appendix #2)

Public participation for members of the Squaw Creek staff are listed:

Participations

By Refuge Manager Burgess:

1/1 Conducted six area birders on Audubon Bird Count and compiled data for Audubon Society.
1/4 Conducted Miss Ardn't Christian Monitor and party on tour of refuge.
1/9 Helped Dr. Trainer and U. of Wisc. graduate students on goose blood survey and tour of refuge.
1/12 Attended Kiwanis meeting.
1/23-29 To, at and from Regional Conference Minneapolis, Minnesota. Presented paper on Master Planning.
2/3 Attended Missouri Game Conference, U of M Extension Center.
2/15 Gave slide talk "Conservation, what it means to me and to you" to Tarkio, Mo. Garden Club.
2/16 Attended Kiwanis meeting.
2/18 Assisted Kiwanis put up Mound City house numbers.
2/23 Attended Kiwanis meeting.

2/26 Conducted 50 Prairie Village, Kansas Boy Scouts on tour and explained refuge objectives.
2/28-3/5 To, at and from Technical Section work shop, Mobile, Alabama and with H. Dill investigated Canada geese potentials at Noxubee NWR and Sardis Reservoir in Mississippi.
3/6 Conducted three Iowa State U. students on tour of refuge.
3/17 Gave slide talk to Maryville Audubon Society.
3/19 Conducted 13 Omaha Bird Clubers on tour and explained refuge objectives. Conducted 50 Kansas City Boy Scouts on tour. Conducted ten members Emporia Kansas State College on tour and explained refuge objectives.
3/20 Conducted 100 members of Kansas City Burrough's Club and Maryville Audubon Club on tour and explained refuge objectives.
3/23 Attended Kiwanis meeting.
3/23 Presented "Waterfowl Tomorrow" to Mound City High School Library.
3/25-26 Hosted 60 members Missouri Chapter, The Wildlife Society and friends from Kansas, Nebraska and Iowa on extended tours, explanations and snow goose productivity appraisals.
3/25 Chaired presentations at Missouri Chapter Wildlife Society banquet and meeting at RockPort, Missouri during evening.
3/30 Demonstrated classification of geese for Mound City Kiwanis.
4/4 With Maintenanceman Boyd and Naturalist Huffman attended Explorer Post 71 reorganization meeting.
4/5 Explained refuge objectives to 37 Albany, Mo. R-III Biology Students.
4/6 Attended Kiwanis meeting.
4/11 With Maintenanceman Boyd and Naturalist Huffman attended organization meeting of Explorer Post 71. Boyd appointed Institutional Representative, Huffman Explorer Advisor and Burgess Assistant Advisor.
4/18 Presented goose classification demonstration to Oregon, Mo. Kiwanis Club.
4/21 Conducted Refuge Manager Stemmerman, Flint Hills NWR, Kansas on an extended inspection of refuge marshes for their master planning.
4/22 Attended Cannon Creek Drainage District meeting at refuge office.
4/26 Explained refuge objectives to 25 Rulo, Nebraska students.
5/6 With Yocum conducted tours and explained objectives to 90 members Savannah, Missouri fourth grade students.
6/27 Conducted 13 members NWMSC, Maryville workshop on tour and explained refuge objectives.
5/8 Received members of Kansas City Burrough's Club and Maryville Audubon Club.
5/10 Explained refuge objectives and conducted tour for members Sheridan, Missouri Biology Class.
5/18-21 Accompanied Explorer Post 71 on Lake of the Ozarks camping trip.
5/25-26 To, at and from Goose Management Conference at Jefferson City, Mo.
6/1 With other staff members served as bus guide of refuge for 300 members Missouri Federated Garden Clubs.
6/8 Attended Kiwanis meeting.
6/13 With Biological Aid Toney helped set up girl scout day camp in Mound City. With Yocum attended Explorer Scout meeting.
6/14 With Toney conducted Cadette Girl Scouts on nature and refuge tours.
6/15 With Toney attended Kiwanis meeting.

6/15 Accompanied by Toney gave slide talk at Tarkio, Missouri Business and Professional Womens annual banquet and meeting.
6/16 With Toney helped set up Girl Scout ceramic workshop at the equipment building.
6/18 With Toney to, at and from Graham, Missouri Methodist Church Fathers Banquet and gave slide talk.
7/8 Explained refuge objectives to CMSC, Warrensburg, Mo. animal ecology class.
7/9 Discussed classification and possible evaluation of brant, snow, white-fronted and Canada geese with CMSC animal ecology class.
7/9-10 Supervised CMSC students drive trapping and banding molting ducks in A-16.
7/25 Hosted US Corps of Engineers, Missouri Department of Conservation meeting on Missouri River access.
7/31 Conducted Robert Brown and party on "critics' tour of refuge".
8/1-3 Attended Mississippi Flyway Technical Section meeting as member of "Other Geese Committee".
8/8 To, at and from Western Missouri Chapter Ducks Unlimited Executive Board Meeting at Kansas City.
8/15 Conducted Reed Bailey Family (ten) on tour of refuge.
8/23 Participated in Squaw Creek Goose Management Conference with other Bureau and State employees.
8/24 Participated in Area Biologist Workshop with Messrs. Stiles, Timmerman, Dybsetter, Dill, Monnie and Dr. Green.
8/31 Demonstrated marsh vegetation and explained refuge marsh management to Mound City Kiwanis.
9/19 Presented $7007.96 check to Holt County Court in session.
10/6 With Cornelius conducted 110 students from Avenue School, St. Joseph on tour of refuge.
10/7 With Cornelius conducted 50 Tarkio sixth graders on tour of refuge.
10/10 Conducted 50 members Rock Port, Mo. Garden Club on tour of refuge.
10/13-16 Conducted 34 participants Lynch's Wild Goose Workshop on several tours. Explained refuge objectives; goose management studies and program.
10/24 Conducted Dr. Clarence Cottam, member of Secretaries Refuge Study Team, on critical tour of refuge.
10/30 With Huffman, Zeliff and Hamilton explained objectives and conducted tours for 300 visitors.
11/6 With Huffman and Yocum explained objectives and conducted tours for 400 visitors.
11/11 Conducted Bill Crawford, Supt. Research and "Buck" Caldwell, Manager Green Experimental Area M.D.C. on tour of refuge.
11/12 Conducted Director John Gottschalk on tour of refuge marshes and waterfowl.
11/13 With Huffman and Cornelius explained objectives and conducted 300 visitors on tours of refuge.
11/14 Attended Ducks Unlimited (public recruiting) meeting.
11/15 Was special guest and received "well done for Refuge and Bureau management of Squaw Creek" from Western Missouri Chapter D.U. at Annual Meeting at Big Lake State Park.
11/16 Attended Kiwanis meeting.

11/20 With Huffman and Yocum explained objectives and conducted 200 visitors on tour of refuge.
11/21 Explained refuge objectives to 70 students and teachers of Horace Mann School, Maryville, Missouri.
11/27 Assisted four U. of Wisc. graduate students with geese health studies.
11/27 With Huffman and Yocum explained objectives and conducted 100 visitors on tours.
11/29 Conferred with Dr. R. Myers, Rod Green and Winfred Asseuva (Kenya) about graduate studies at Squaw Creek NWR.
12/8-9 On annual leave accompanied Dr. Harold Hanson to examine geese at Emporia State College, Emporia, Kansas and returned.
12/9-11 On annual leave accompanied Dr. Hanson to Illinois Natural History Survey, Urbanna, Illinois to study geese classification and distribution.
12/11-14 On annual leave to, at and from Midwest Wildlife Conference, Chicago, Illinois. Spent four hours examining "Field Museum" geese skins.

By Biological Technician Yocum:

1/13 Gave slide talk to 20 Skidmore, Missouri Lions.
2/21 Attended meeting on weed and insect control at Mound City School.
2/22 Conducted Mound City Cub Pack 71 meeting.
3/10 Conducted 22 Shubert, Nebraska School students on tour of refuge.
3/25 With (Laborer-Naturalist) Huffman attended Missouri Chapter Wildlife Society banquet and meeting at Rock Port, Missouri.
3/28 Conducted Mound City Cub Pack 71 meeting.
4/5 Conducted bus tour of refuge for 37 Albany, Missouri students and faculty.
4/6 Gave slide talk to ten members Christian Church young married couples class.
4/22 Attended Cannon Creek Drainage District Meeting.
4/22 Explained refuge objectives to Northwest State College, Maryville, Missouri Animal Ecology Class.
4/23 With Operator General Hamilton (Cubmaster and Scoutmaster) attended Scout-A-Rama at Maryville, Missouri.
4/26 Conducted 25 Rulo, Nebraska students on tour of refuge.
5/13 Conducted Mound City fifth grade on tour and explained refuge objectives.
6/1 Helped conduct Missouri Federated Garden Clubs tour.
6/14 Transported Explorer Scouts to Kansas City Chiefs ball game.
8/24 Participated in Squaw Creek Goose Management Conference.
9/14 Gave slide talk to Mound City Kiwanis.
10/13-14 Assisted with Lynch's "Wild Geese Workshop".
10/17 Conducted 36 Morrill, Kansas grade school students on tour of refuge.
11/6 Helped conduct refuge tours.
11/8 Gave slide talk to 12 members of Omega, Club.
11/20 Helped conduct refuge tours.

11/21 Conducted 70 students and teachers, Horace Mann School, Maryville, Missouri on tour of refuge.
11/27 Helped conduct refuge tours.
12/10 Explained refuge objectives and conducted 20 Nodaway-Holt students on tour.
12/14 Accompanied Regional Engineer and Assistant Refuges Supervisor to Cannon Drainage District Meeting, Oregon, Missouri.

By Operator General Hamilton:

5/27 With Boy Scout Troop 71 assisted with auto safety check in Mound City.
6/1 Helped conduct Missouri Federated Garden Clubs tour.
7/3-9 As Scoutmaster attended area Boy Scout Camp with Mound City troop.
10/30 Helped conduct refuge tours.

By Biological Aid Toney:

6/13 Helped set up Girl Scout Day Camp.
6/14 Helped conduct Cadette Girl Scouts on refuge nature tour.
6/14 Helped conduct Fairfax, Missouri Garden Club members on tour of refuge.
6/15 Attended Kiwanis Meeting with Mr. Burgess.
6/15 Conducted Junior Girl Scouts on refuge nature tour.
6/15 Attended Tarkio Business and Professional Women's Club annual meeting with Mr. Burgess.
6/16 Conducted teachers and 25 pre-schoolers, Oregon, Missouri on tour of refuge.
6/17 Conducted Troop of Brownie Girl Scouts and Cadette Crew on refuge nature tour.
6/18 Attended Graham, Missouri Methodist Church fathers banquet with Mr. Burgess.
6/27 Helped Missouri Department of Conservation roundup and band Canada geese at Trimble Wildlife Management Area.
7/8 Helped C.M.S.C. zoology students set up camp.
8/23 Participated in Squaw Creek Goose Management Conference.

By Biological Technician Cornelius:

8/13 Assisted with Lynch's "Wild Geese Workshop".
11/13 Assisted with refuge tours.
11/14 Attended Ducks Unlimited public meeting at Mound City. (Mrs. Cornelius received door prize, Canadian fishing trip for two.)
11/27 Assisted U. of Wisc. students handle geese.

By Laborer(Naturalist) Huffman:

10/30 Sat up loud speakers, received visitors and helped conduct refuge tours.
11/6 Sat up loud speakers, received visitors and helped conduct refuge tours.
11/13 Sat up loud speakers, received visitors and helped conduct refuge tours.
11/20 Sat up loud speakers, received visitors and helped conduct refuge tours.
11/27 Sat up loud speakers, received visitors and helped conduct refuge tours.

D. Hunting

Hunting was not permitted on Squaw Creek National Wildlife Refuge during 1966. We were concerned with the hunting in the Squaw Creek area that influences wildlife use of the refuge. In recent years we have been particularly concerned with the over-harvest of Canada geese and the under-harvest of snow geese in this area. The 1966 goose harvest indicates considerable correction of this situation.

The second experimental teal hunting season was open September 17-25, 1966. Hunter performance observations indicated an increased number of hunters opening the season, poor success and decreased total effort compared to the 1965 nine day season. The 1966 kill was estimated at 1125 compared to 1760 estimated for the 1965 special teal hunting season.

In 1966 Squaw Creek area hunters were offered a 70 day goose season starting October 20 with an aggregate bag of five geese. The Canada goose season was restricted to 30 days and one Canada goose in the bag. Missouri regulations further required that all Canada geese shot in the Squaw Creek area be registered at established check stations.

The regular duck hunting season was open November 1 - December 15, 1966 with an aggregate bag limit of four, not including more than two mallards and two wood ducks.

The estimated waterfowl harvest and details are reported in Part 5 Projects 3 and 4. The percent kill of the 1966 peak fall populations are shown below:

Table 26. Percent kill of 1966 peak fall populations

Species	Canadas(1) Large	Canadas(1) Small	Snow-(2) Blues	White-(2) Fronts	(2) Mallard	All(2) Ducks
Peaks	8,000	1,020	158,400	200	400,000	405,690
Est. Kill	861	371	18,046	14	14,213	17,496
% Kill	10.7	36.4	11.4	7.0	3.5	4.3

(1) Based on compulsory check station data.
(2) Based on processor data.

In 1964 hunters killed 27,690 units of waterfowl in 25,000 trips for 1.1 waterfowl killed per trip. If similar success was enjoyed in 1966, then the 36,788 waterfowl units killed during the regular seasons represent 33,444 trips and the 1,125 killed during the special teal season indicate 1,023 trips or a total of 35,450 waterfowl hunting trips.

We estimate an additional 500 hunting trips were used to chase squirrels, cottontails, quail, pheasants, raccoon and other small game and 200 trips were used to pursue deer in this vicinity during 1966.

E. Violations

Missouri Conservation Agents and U.S. Game Management Agents again did an excellent job in patrolling the Squaw Creek area. Three members of the refuge staff helped with patrols, hunter observations and the apprehension of violators.

The following defendants were processed by Magistrate Judge John Bowes, Oregon, Missouri:

Date	Name and Address	Violation	Witness	Fine/Costs
4/24	Phillip Rauch	Hunting w/o license	Burgess	$10. $12.
	Robert Rauch	attempting to take teal	Burgess	(minor-13 yr.)
	Leroy Scott		Burgess	(minor-14 yr.)
	Mound City, Mo.			
9/17	John Buckley Jr.	Take shoveler in closed	Burgess &	
	Des Moines, Ia.	season	Wheeler	$10. $12.
10/18	Jerry W. Carr	Take snow geese in	Burgess	$5. $12.
	John A. Mackey	closed season	Burgess	$5. $12.
	Forest City, Mo.			
10/20	Louis A. Clark	Bagged 2 Canadas	Clifton	$10. $12.
	Dale L. Haerath	Bagged 6 snow geese	Clifton	$10. $12.
	St. Joseph, Mo.			
10/23	Dennis Schutt	Take deer w/o proper	Clifton &	
	Conway Springs, Ks.	permit	Hamilton	$15. $12.
10/27	Joe W. Reece	Take waterfowl after	Hague &	$10. $12.
	Edward D. Lemmon	legal time	Clifton	$10. $12.
	Savannah, Mo.			
10/27	Frank W. Faller	Take 2 Canada geese	Hague &	
	Falls City, Nebr.		Clifton	$10. $12.
10/29	Lorenzio Donarico	Take 2 Canada geese	Burgess &	
	Omaha, Nebr.		Clifton	$10. $12.
11/5	Robert Carpenter	Take waterfowl after	Armstrong	$5. $12.
	St. Joseph, Mo.	legal time		
11/8	Ernst Frye	Attempt take waterfowl		
	St. Joseph, Mo.	after legal time	Burgess	$5. $12.
11/9	Charles Loucks	Hunting w/o permit	Yocum	$5. $12.
	Mike Jones		Yocum	(minor)
	Mound City, Mo.			
11/20	George Ralston	Take Canada geese in	Clifton	$5. $12.
	William White	closed season		$5. $12.
	St. Joseph, Mo.			
11/20	Steven Palmer	Hunting trespass on		
	St. Joseph, Mo.	refuge	Hamilton	$5. $12.
12/3	Wilbur W. Black	Take waterfowl from	Hague &	
	Oregon, Mo.	motor vehicle	Clifton	$5. $12.
12/3	William Franklin	Take waterfowl from	Hague &	
	Kansas City, Mo.	motor vehicle	Clifton	$5. $12.

By U.S. Commissioner Victor Gehrs, St. Joseph, Missouri:
(Cases made in 1965 processed in 1966.)

Date	Name and Address	Violation	Witness	Fine/Costs
1/17	John Patterson Maitland, Mo.	Failure to sign duck stamp	Chord	$10. $11.
	Harkert Catterson	Same	Chord &	$10. $16.
	Robert Dunn	Same	Clifton	$10. $16.
	Roe Lawrance Maryville, Mo.	Same		$15. $16.

Tavern-keeper Calvin Rogers Rulo, Nebraska and Craig, Missouri was found guilty of possessing overlimit of and commercializing waterfowl was found guilty by Federal District Court, his appeal to court of appeals was denied and he is now appealing to the Supreme Court. Meanwhile he pled guilty to selling quail in Magistrate Court and was fined $75. and $12. for this offence.

Cases made in 1966:

10/20	Taylor Abernathy St. Joseph, Mo.	Hunt geese w/o duck stamp	Yocum	$25. $11.

F. Safety

On December 31, 1966 our safety record had reached 1,383 days without a lost time accident. Safety meetings and safety discussions were held regularly during the year when appropriate. New employees were oriented on this phase of refuge operations before they were permitted to start other activities.

Safety shields were placed on the rotary mowers. A tree guard was built on the TD-18.

VII Other Items

A. Items of Interest

1. The Corps of Engineers continued to promote reactivation of their Squaw Creek Big Ditch proposal. The Cannon Drainage is organized but construction is held up due to lack of funds.

2. The Holt County Loess Foundation was stymied in acquiring additional area by their own promotional schemes. This group and the nature conservancy is no closer than they were in 1965 with control of the area retained by the local banker.

3. The report was drafted by the manager and typed by clerk-typist. Mr. Yocum extracted the official visitor list from our register and prepared the photo layouts.

SIGNATURE PAGE

Submitted by:

Harold H. Burgess
(Signature)

Harold H. Burgess
Refuge Manager
Title

Date: February 8, 1967

Approved, Regional Office:

Date: February 10, 1967

Harry E. Stiles
(Signature)

Asst. Regional Refuge Supervisor

Squaw Creek Refuge Photographs

Photo #1, Burgess R-5-2, 1/16/67

A frosty morning and crew.

The Work Crew: left to right: Biological Technician Stanley Cornelius (temporary), Dragline Operator Alva Bomar, Maintenance Man Walter Boyd (seasonal), Operator General William Hamilton, Clerk-Typist Mrs. Shirley Zeliff and Biological Technician Junior Yocum in front of our Office-Visitor Center.

Squaw Creek Refuge Photographs

Photo # 2 Burgess R-2-1, 7/21/66
Jay Gore, Biologist, Tennesee Game and Fish Commission, inspects excellent crop of wild millet produced on the silted Main Pool when drouth dried it.

Photo # 3 Gore R-2-2, 7/21/66
Missouri Conservation Agent Jan Clifton and Refuge Manager Burgess inspect moist soil food plants in the Main Pool - usually a barren water storage area. It is an ill drought that does no good.

Squaw Creek Refuge Photographs

Photo # 4 Gore R-2-3, 7/21/66
Refuge Manager Burgess inspects rank growth of nodding smartweed Palygonum lapathifolium in the Main Pool. He prefers the later larger-seeded P. pennsylvanicum but beggars can't be choosers when it comes to waking up this silted reservoir.

Photo # 5 Burgess R-2-11, 7/21/66
Vegetation Transect # 4 across the Main Pool indicated 34% of stems were wild millet and 18% were smartweeds. Seed boxes indicated that over 1100 pounds of seed were produced per acre from 8/15 to 9/15/66.

Squaw Creek Refuge Photographs

Photo # 6 Burgess R-4-7, 10/10/66
When a mud reservoir became a marsh - it came alive! In addition to gobbling wild millet and smartweed seeds, waterfowl grubbed up and ate pigweed, cattail and bulrush roots.

Photo # 7 Burgess R-4-10, 10/16/66
Dr. William Elder, University of Missouri, showing his wildlife students the results of marsh management in the Main Pool.

Squaw Creek Refuge Photographs

Photo # 8 Burgess R-4-5, 10/10/66
The foundation of a good bridge joining the South Levee Road across Squaw Creek.

Photo # 9 Burgess R-5-16, 1/22/67
The South Levee Bridge - a dream realized. Safety bannisters will be installed.

Squaw Creek Refuge Photographs

Photo # 10 Burgess R-2-6, 7/21/66
"A new look." View from newly acquired Andler Tract over A-2, Dragline shed and Main Pool.

Photo # 11 Burgess R-2-7, 7/21/66
Andler Valley and lookout.

Squaw Creek Refuge Photographs

Photo # 12 Burgess R-3-8, 8/31/66

Unit # 5 was successfully burned in August, 1966. This retarded an invasion of silky dogwood, willows and other emergents but did not green up for goose browse as hoped due to the drought. Mallards were observed loafing on the area during several fall wind storms.

Squaw Creek Refuge Photographs

Photo # 13 Burgess R-5-13, 1/22/67
Central Missouri State College student Bob Clement on Main Pool ice viewing waterfowl.

Photo # 14 Burgess R-5-14, 1/22/67

It all adds up to a lot of ducks, geese and birdwatchers.

Squaw Creek Refuge Photographs

Photo # 15 By Lou Swenson

283 Canada geese were checked in at the Bigelow Check Station in 1966.

3-1750
Form NR-1
(Rev. March 1953)

WATERFOWL

REFUGE Squaw Creek

MONTHS OF Sept. 3 TO Nov. 10, 19 66

(1) Species	Weeks of (2) reporting period									
	1 9/3-9	2 9/10-16	3 9/17-23	4 9/24-30	5 10/1-7	6 10/8-14	7 10/15-21	8 10/22-28	9 10/29-11/3	10 11/4-10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada Large	0	13	600	750	1,000	1,000	1,060	2,520	4,000	5,260
Cackling Small			60	140	200	700	1,020	280	215	240
Brant								1	1	1
White-fronted			5	20	20	200	200	40	30	10
Snow			200	5,000	10,000	41,500	100,000	100,000	78,300	106,700
Blue			400	1,800	4,100	8,810	50,000	50,000	38,650	51,700
Other TOTAL GEESE		13	1,265	7,710	15,320	52,210	152,280	152,841	121,196	163,911
Ducks:										
Mallard	70	120	1,710	4,210	3,300	5,000	20,000	234,150	277,100	360,000
Black				10	20	20	100	200	300	350
Gadwall			20	20	100	100	2,000	2,740	2,000	1,000
Baldpate	10	50	160	50	310	500	5,000	1,250	2,000	2,000
Pintail	1,030	2,100	4,000	10,250	11,000	20,000	30,000	13,850	13,000	11,000
Green-winged teal	620	2,000	4,000	10,000	15,000	15,000	15,000	20,560	20,000	25,000
Blue-winged teal	3,100	9,500	17,500	240	700	600	500	50	50	100
Cinnamon teal										
Shoveler	20	100	200	360	220	300	500	1,200	800	200
Wood	20	10	20	50	100	100	100	220	200	150
Redhead							10	10		
Ring-necked								100	100	100
Canvasback										
Scaup										100
Goldeneye										
Bufflehead									10	10
Ruddy								10		
Other TOTAL DUCKS	4,870	13,880	27,610	25,190	30,750	41,620	73,210	274,340	315,560	400,010
Coot:	4	4	2,100	1,040	1,200	3,500	3,000	1,130	1,000	900

Int. Dup. Sec., Wash., D.C. 37944

3 -1750a
Cont. NR-1
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Squaw Creek MONTHS OF Sept. 3 TO Dec. 31, 1966

(1) Species	(2) Weeks of reporting period: 11/12-18 (11)	11/19-25 (12)	11/26-12/2 (13)	12/3-9 (14)	12/10-16 (15)	12/17-23 (16)	12/24-30 (17)	12/31 (18)	(3) Estimated waterfowl days use	(4) Production: Broods seen	(4) Production: Estimated total
Swans:											
Whistling											
Trumpeter Ross'				1	1	1	1		28		
Geese:											
Canada Large	7,700	7,750	7,750	7,950	8,000	8,000	8,000	6,000	505,471		
Cackling Small	500	525	270	50	20	20	10		29,750		
Brant	1	1							35		
White-fronted	4	4				57,000	40,000	11,100	3,731		
Snow	68,700	77,500	77,500	77,000	74,000	42,200	26,000	7,190	6,199,390		
Blue	33,500	41,500	41,000	33,000	26,200	15,000	14,000	3,910	2,871,530		
Other Total Geese	110,405	127,280	126,520	118,001	108,221	65,221	48,011	17,100	9,609,935		
Ducks:											
Mallard	340,000	301,100	250,000	250,000	400,000	251,000	101,300	650	19,594,070		
Black	400	330	300	300	400	250	150	1	21,911		
Gadwall	2,000	200							71,260		
Baldpate	1,200	1,100	100	100					96,810		
Pintail	31,000	30,200	10,000	10,000	1,000	100	20	9	1,389,859		
Green-winged teal	31,000	30,200	10,000	10,000	600	60	10		1,463,350		
Blue-winged teal									226,380		
Cinnamon teal											
Shoveler	20	20	10	10					27,720		
Wood	30	30	20	20	20	20	10	10	7,850		
Redhead									140		
Ring-necked	10	10	10	10					2,380		
Canvasback											
Scaup	10								770		
Goldeneye											
Bufflehead	10	10							280		
Ruddy	10	10							210		
Other Mergansers		10	10	10	10	10			350		
Total Ducks	405,690	363,220	270,450	270,450	402,030	251,440	101,490	670	22,903,340		
Coot:	15								97,251		

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	9,609,935	163,911	
Ducks	22,903,340	405,690	
Coots	27,251	3,500	

SUMMARY

Principal feeding areas Refuge managed marshes.

Principal nesting areas

Reported by

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C.
1953

16242

3-1751
Form NR-1A
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge Squaw Creek Months of Sept. 3, to Dec. 31, 1966

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										Days Use
Pied-billed Grebe	*		25	9/17-23	2	10/29				375
White Pelican	*		1200	9/24-30	1	10/29				12,000
Double-crested Cormorant	30	9/25	30	9/25	30	9/25				30
Great Blue Heron	*		55	9/17-23	3	11/17				1,500
Green Heron	*		2	9/3-9	1	9/17				30
Little Blue Heron	*		2	9/3-9	2	9/3				2
Common Egret	*		5	9/17-23	2	10/15				130
Black-crowned Night Heron	*		10	9/17-23	3	11/6				320
Yellow-crowned Night Heron	*		13	9/3-9	1	9/24				130
American Bittern	3	9/17	3	9/17-23	1	10/29				75
King Rail	*		1	9/3-10/1	1	10/1				30
Sora Rail	3	9/3	32	9/17-23	10	10/22				960
II. Shorebirds, Gulls and Terns:										
Semi-palmated Plover	*		12	9/17-23	1	10/1				240
Killdeer	*		40	10/15-21	19	11/17				1,200
American Golden Plover	5	9/3	12	9/24-10/7	1	10/22				180
Black-bellied Plover	1	9/24	10	10/15-21	2	10/22				300
Common Snipe	*		500	10/21-11/3	30	11/17				4,000
Greater Yellowlegs	*		3	10/15-21	3	10/22				45
Lesser Yellowlegs	*		100	9/24-30	10	10/22				1,500
Pectoral Sandpiper	*		180	9/3-9	30	10/15				2,700
Least Sandpiper	*		4	9/3	4	9/3				4
Stilt Sandpiper	*		150	9/3-9	12	10/1				2,250
Semi-palmated Sandpiper	5	9/3	5	9/3-9	3	10/15				135
American Avocet	8	10/25	8	10/15-21	1	10/29				60
Wilson's Phalarope	*		1	9/17	1	9/17				1
Short-billed Dowitcher	*		60	10/15-21	1	10/22				420
Ring-billed Gull	*		12	9/17-23	10	10/15				300
Franklin's Gull	10,000	10/15	10,000	10/15	10,000	10/15				10,000

(over)

(1)	(2)		(3)		(4)		(5)		(6)
									Days Use
III. Doves and Pigeons:									
Mourning dove	*		200	9/17-23	5	12/31			5,000
White-winged dove									
IV. Predaceous Birds:									
Golden eagle	4	10/15	5	10/15-22	3	10/22			35
Duck hawk									
Horned owl	*	11/10	6	9/24-30	4	12/31			720
Bald Eagle Adult	2	11/10	18	12/31	18	12/31			620
Bald Eagle Imm.	4	10/22	79	12/3-9	78	12/31			2,400
Crow	*		43	12/31	43	12/31			5,160
Goshawk	1	11/17	1	11/17-12/31	1	12/31			1
Sharp-spinned Hawk	1	11/10	1	11/10	1	11/10			300
Cooper's Hawk	1	10/15	1	10/15-12/31	1	12/31			240
Red-tailed Hawk	*		20	12/31	20	12/31			1,200
Harlan's Hawk	1	9/24	7	12/31	7	12/31			300
Rough-legged Hawk	1	10/22	16	12/31	16	12/31			900
Marsh Hawk	*		38	12/31	38	12/31			1,200
Continued									

Reported by.....

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total numl of the species using the refu during the period concerned.

INT.-DUP. SEC., WASH., D.C.

59317

3-1751
Form NR-1A
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge Squaw Creek Months of September 3 to December 31 1965 66

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
II. Shorebirds, Gulls and Terns:										

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove								
White-winged dove								
IV. Predaceous Birds:								
Golden eagle								
Duck hawk								
Horned owl								
Magpie								
Raven								
Crow								
Pigeon Hawk	1	11/10	1	11/10	1	11/10		45
Sparrow Hawk	*		4	9/24-30	1	12/17		1
Screech Owl	*		4	9/24-30	2	11/10		480
Barred Owl	*		4	9/24-30	2	12/24		480
Short-eared Owl	*		3	12/3-31	1	12/31		90
Saw-whet Owl	1	11/21	1	11/21-12/3	1	12/3		1,200

Reported by.....

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total numl of the species using the refu, during the period concerned.

INT.-DUP. SEC., WASH., D.C.

5-317

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge Squaw Creek Months of September 3 to December 31, 1966

(1) Species	(2) Density	(3) Young Produced			(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres Per Bird	Number broods observed	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	Brush, Wet Prairie and Cropland	10							200	
Bobwhite Quail	Brush, Levees and Cropland	10							200	

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, phesants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

*Only columns applicable to the period covered should be used.

3-1753
Form NR-3
(June 1945)

BIG GAME

Refuge Squaw Creek Calendar Year 1966

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population		(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
White-tailed Deer	Cropland, Wet Prairie, Swamp and Dry Marsh	30										200	100	No data

Remarks:

Reported by Harold H. Burgess

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge: once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated total number of young produced on refuge.

(4) REMOVALS: Indicate total number in each category removed during the year.

(5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each</u> <u>species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

(8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

3-1755
Form NR-5
60701

DISEASE

Refuge Squaw Creek Year 19 66

Fowl Cholera

Period of outbreak December 23-31

Period of heaviest losses December 30-31

Losses:

	Actual Count	Estimated
(a) Waterfowl	3	18
(b) Shorebirds		
(c) Other		

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Areas affected (location and approximate acreage) A-15&19

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.

Water was low but apparently not related to this infection as snow geese loitered on dry land and no mallards appeared affected.

Condition of vegetation and invertebrate life

Remarks A few immature snow geese died of cholera in A-19 cornfield where they fed and rested after snow storm of December 27-28.

Lead Poisoning or other Disease

Kind of disease Lead Poisoning

Species affected Mallards, Canada and Snow Geese.

Number Affected Species	Actual Count	Estimated
Mallards		1000
Canada Geese		10
Snow Geese		20

Number Recovered 500

Number lost 530

Source of infection Private hunting ponds.

Water conditions Low.

Food conditions Good.

Remarks Lead poisoning reduced by campaign to drain hunting ponds at end of duck hunting season supplemented by encouraging waterfowl to move south.

NR-6 Bureau of Sport Fisheries and Wildlife

PUBLIC RELATIONS

(See Instructions on Reverse Side)

Refuge Squaw Creek Calendar Year 1966

1. Visits

a. Hunting None b. Fishing 1,500 c. Miscellaneous 11,420 d. TOTAL VISITS 12,920

1a. Hunting (on refuge lands)

TYPE	HUNTERS	ACRES	MANAGED BY
Waterfowl			
Upland Game			
Big Game			
Other			

Number of permanent blinds

Man-days of bow hunting included above

Estimated man-days of hunting on lands adjacent to refuge 36,150

35,450 Waterfowl
500 Small Game
200 Deer

1b. Fishing (area open to fishing on refuge lands)

TYPE OF AREA	ACRES	MILES
Ponds or Lakes	1,000	
Streams and Shores		10

1c. Miscellaneous Visits

Recreation 11,420 Official 300

Economic Use 1,200 Industrial

2. Refuge Participation (groups)

TYPE OF ORGANIZATION	NO. OF GROUPS	NUMBER IN GROUPS	NO. Of GROUPS	NUMBER IN GROUPS
Sportsmen Clubs			1	50
Bird and Garden Clubs	6	548	3	120
Schools	16	555		
Service Clubs			12	232
Youth Groups	3	175	7	415
Professional-Scientific	1	60	2	250
Religious Groups	1	18	2	60
State or Federal Govt.	8	94	3	313
Other Sunday Tours	5	1,300		

3. Other Activities

TYPE	NUMBER	TYPE	NUMBER
Press Releases	26	* Radio Presentations	26
Newspapers (P.R.'s sent to)	18	Exhibits	12
* TV Presentations	26	Est. Exhibit Viewers	11,420

3-1756
(Rev. 4/63)

* All news releases also sent to radio and tv.

INSTRUCTIONS

Item 1: Total of a, b, and c, equal d.

"Visit" - definition. Any person who is on refuge lands or waters during a day or part thereof for the purpose of: hunting, fishing, bird-watching, recreation, business or economic use, official visit, or similar interest. INCLUDE - those who stop within the refuge while traveling on a public highway because of an interest in the area. EXCLUDE - persons engaged in oil or other industry not directly related to the refuge, persons using refuge as most direct route or principal avenue of traffic, and those boating on navigable rivers or the Intercoastal Canal, unless they stop to observe wildlife on the refuge.

Computing visits. Where actual counts are impractical, "sampling" is used with midweek and weekend samples varied by season or weather. A conversion factor of 3.5 (of passengers per car) is used when accurate figures are not available. Each refuge will develop a conversion factor for boats based on range of usage. Count a camper once for each 24-hour period or fraction thereof.

Item 1a: Acres - of refuge open for each type of hunting.

Managed hunts require check in and out of hunters, issuance of permits, or assignment of blinds.

Other - INCLUDE crow, fox, and similar hunting.

Lands adjacent to refuge. Normally considered within 1 mile or less of boundary, unless established sampling procedures cover a wider area. For big game hunting, the distance may be greater.

Item 1b: Acres of streams open to fishing, if practical; otherwise just miles open. Information on "shores" is primarily for coastal fishing.

Item 1c: Recreation. INCLUDE photography, observing wildlife, picnicking, swimming, boating, camping, visitor center use, tours, etc. TOTAL Recreation, Official, and Economic Use visits under Item 1.

Industrial. INCLUDE persons engaged in industry, i.e., oil industry or factories. EXCLUDE these from Item 1.

Item 2: INCLUDE the "On Refuge" groups in Items 1c and 1. In "Off Refuge" column include only those group meetings in which refuge employees actually participate. EXCLUDE these from Items 1c and 1.

Item 3: Exhibits - INCLUDE displays, fairs, parades, and exhibits OFF the refuge; EXCLUDE those ON.

:-1757
:orm NR-7
Rev. June 1960)

(1)

NONAGRICU[illegible]URAL COLLECTIONS, RECEIPTS, AND [illegible]LANTINGS

Refuge Squaw Creek Year 1966

	Collections and Receipts (Seeds, rootstocks, trees, shrubs)						Plantings (Marsh - Aquatic - Upland)						
Species	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source	Cost	(3) * Total Amount on Hand	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount and Nature of Propagules	Date	Survival	Cause of Loss
Smart weeds	1500#	C	9/9	Combine	35.00	None	None						
Wild Millet	1500#	C	8/30	Combine	40.00	None	None						

(1) Report agronomic farm crops on Form NR-8
(2) C = Collections and R = Receipts
(3) Use "S" to denote surplus

Total acreage planted: None
Marsh and aquatic
Hedgerows, cover patches
Food strips, food patches 2 A
Forest plantings

Remarks: *Shipped as follows:
Crab Orchard - 1,000# Millet & 200# Smartweed; Necedah - 500# Millet & 200# Smartweed; Upper Souris - 300# Smartweed; Mark Twain (Calhoun) 800# Smartweed.
Smartweeds harvested were Polygonum pennsylunicum and lapathafolium. Wild Millet was Echinochloe pungens.

-3-1758
Form NR-8
(Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

1966 CULTIVATED CROPS - HAYING - GRAZING

Refuge Squaw Creek County Holt State Missouri

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Waterfowl Browsing Crops Type and Kind	Total Acreage
			Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
Corn	270	23,735 bu.	5	375	416	43,575	691	Wheat	638
Soybeans	149	6,052 bu.					149	Rye	44
Wheat	24	1,065 bu.	22	660			46	Oats	22
German Millet					45	Failed	45	Brome	19
Rye (Elbon)			3	150			3	Alsike	12
Brome			3	60			6	Reed Canary	12
								Mixed brome, reed canary & alsike	12
								Fallow Ag. Land.	20

No. of Permittees: Agricultural Operations 7 Haying Operations 3 Grazing Operations 2

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue
Alfalfa	24.5	10	
Mixed domestic hay	58.72	30	125.42
Hay - Wild	73.8	50	177.65

Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
1. Cattle	46	90	90.00	80
2. Other	2 ponies	1	1.00	1
1. Total Refuge Acreage Under Cultivation				1701
2. Acreage Cultivated as Service Operation				735

DIRECTIONS FOR PREPARING FORM NR--8'
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only thenumber of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvesed column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops. Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

3-1570
NR-88
(4/54)

REFUGE GRAIN REPORT

Refuge Squaw Creek Months of January through December, 1956

(1) Variety*	(2) On Hand Beginning of Period	(3) Received During Period	(4) Total	(5) Grain Disposed of				(6) On Hand End of Period	(7) Proposed or Suitable Use*		
				Transferred	Seeded	Fed	Total		Seed	Feed	Surplus
Corn - Shelled	200	250	450	206		50	256	194		194	
Corn - Ear	100	375	475			450	450	25		25	
Wheat - Winter	100	1250	1350		1275	60	1335	15		15	
Brome grass	50	60	110		70		70	40	40		
Rye - Elbon		150	150	52	98		150	0			

(8) Indicate shipping or collection points Squaw Creek Refuge, Mound City, Mo.

(9) Grain is stored at Headquarters corn cribs and graineries.

(10) Remarks

*See instructions on back.

NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lb., corn (ear)—70 lb., wheat—60 lb., barley—50 lb., rye—55 lb., oats—30 lb., soy beans—60 lb., millet—50 lb., cowpeas—60 lb., and mixed—50 lb. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

(1) List each type of grain separately and specifically, as flint corn, yellow dent corn, square deal hybrid corn, garnet wheat, red May wheat, durum wheat, spring wheat, proso millet, combine milo, new era cowpeas, mikado soy beans, etc. Mere listing as corn, wheat, and soybeans will not suffice, as specific details are necessary in considering transfer of seed supplies to other refuges. Include only domestic grains; aquatic and other seeds will be listed on NR–9.

(3) Report all grain received during period from all sources, such as transfer, share cropping, or harvest from food patches.

(4) A total of columns 2 and 3.

(6) Column 4 less column 5.

(7) This is a proposed break-down by varieties of grain listed in column 6. Indicate if grain is suitable for seeding new crops.

(8) Nearest railroad station for shipping and receiving.

(9) Where stored on refuge: "Headquarters granary," etc.

(10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

INT.-DEP. SEC., WASH., D.C. 17065

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PESTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 1

Reporting Year: 1966

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4/26-6/30/66	Foxtail and other weeds in corn	A-1,2,3,5,6,7,8,9, 12,13,14,16,17,19	691	Atrazine	1382 lbs.	2#/A.	Water 20 gal/A.	Ground Spray

10. Summary of results (continue on reverse side, if necessary)

Weed control by atrazine used as pre emergent was good early in season but only fair to poor as drought progressed. Cultivation was necessary.

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PESTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 2

Reporting Year: 1966

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5/11-7/14/66	Weeds in Soybeans	A-4,7,8,14,18	149	Amiben	372 lbs.	2½#/A.	Water 10 gal/A	Ground Spray

10. Summary of results (continue on reverse side, if necessary)

Foxtail and grass control was good but sunflowers were not affected.

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PESTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 3

Reporting Year: 1966

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7/ /66	Johnson Grass	Bell Telephone Right of way	2	Dowpon	18#	6#/A.	Water 25 gal/A	Ground Spray

10. Summary of results (continue on reverse side, if necessary)

Control was good, still a few scattered Johnson Grass plants in the area.

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PESTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 4

Reporting Year: 1966

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6/1-9/15/66	Willow-salix interior, nigra and amydaloides and cottonwood-populus deltoides	A-7 ditch, Davis and Squaw Creeks and Northwest Pool	55	2-4,D & 2-4-5,T	27# each	½#/A.	Water 10 gal/A	Ground Spray

10. Summary of results (continue on reverse side, if necessary)

Control of willow good, poor on cottonwood.

3550

BIRDS OF THE
SQUAW CREEK
NATIONAL WILDLIFE REFUGE

Squaw Creek National Wildlife Refuge, established in 1935, contains 6,809 acres and is in northwestern Missouri, near Mound City, in Holt County, 40 miles northwest of St. Joseph. This area is a unit in the chain of refuges extending through the Mississippi Flyway from Canada to the Gulf of Mexico.

Located in the flood plain of the Missouri River, the refuge was once a cordgrass marsh with meandering creek channels, which was dredged for agricultural drainage. After the refuge was established, dams and ditches were built to make a series of pools and preserve a wetland habitat. About 1,000 acres of bottomland are farmed by refuge personnel to provide food for large concentrations of migrating or wintering waterfowl. Refuge habitats vary from open pools and marshland to scenic loess bluffs where ungrazed, unburned woodlands provide good upland bird-watching. A sizable acreage of cordgrass is preserved.

Birding possibilities are good all year, although spring and fall offer most variety. Summer is a quiet season, but many nesting upland marsh birds can be found. About 100,000 mallards, 5,000 Canada geese, and some blue and snow geese normally winter on the refuge. About 50 bald eagles are here during that season. Migrant duck populations of 200,000 or more are frequent. Most spectacular is the spring movement of blue and snow geese, when a flock of a quarter of a million birds is not unusual. Several thousand white pelicans visit the refuge in spring and fall. Common egrets are a familiar summer sight, feeding in shallow water with numerous great blue and green herons. Squaw Creek Refuge has one of the highest pheasant populations in Missouri. These birds may be seen easily along roads in morning and evening.

The following birdlist contains 253 species observed since 1937. Another 23 species, rare or accidental, have been added. Those marked with an * nest in the area. Some summer shorebirds, flycatchers, and swallows are early migrants and not breeders. This list is in accordance with the Fifth (1957) A.O.U. Check-list. Abundance symbols are grouped under columns representing the four seasons of the year, as follows:

S - March - May	a - abundant
S - June - August	c - common
F - September - November	u - uncommon
W - December - February	o - occasional
	r - rare

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

	S	S	F	W
Common Loon	r		r	
Horned Grebe	u		u	
Eared Grebe	u		u	
Pied-billed Grebe	c	u	c	
White Pelican	a	r	a	
Double-crested Cormorant	c	r	c	
Great Blue Heron	c	c	c	r
*Green Heron	u	c	o	
Little Blue Heron		o	r	
Common Egret	c	c	r	
Snowy Egret		u		
*Black-crowned Night Heron	o	c	o	
Yellow-crowned Night Heron		o	o	
*Least Bittern	o	o		
*American Bittern	o	u	u	r
White-faced Ibis	r	r	r	
Whistling Swan	r		r	
Canada Goose	a	u	a	c
White-fronted Goose	o		c	
Snow Goose	a	r	a	o
Blue Goose	a	r	a	o
*Mallard	a	c	a	a
*Black Duck	o	o	o	c
Gadwall	c	r	c	
Pintail	a	r	c	o
Green-winged Teal	c	r	c	u
*Blue-winged Teal	c	o	c	r
Cinnamon Teal	r		r	
American Widgeon	c	r	c	
Shoveler	c	r	c	
*Wood Duck	o	c	c	
Redhead	o		o	
Ring-necked Duck	o		o	
Canvasback	u		u	
Greater Scaup			r	
Lesser Scaup	c	r	c	
Common Goldeneye	o		o	u
Bufflehead	u		u	
White-winged Scoter			r	
Ruddy Duck	u	u	u	
Hooded Merganser	u	u	u	
Common Merganser	c		o	c
Red-breasted Merganser	o		o	
Turkey Vulture	u	c	u	
Goshawk				r
*Sharp-shinned Hawk	u	u	u	u
*Cooper's Hawk	o	o	o	o
*Red-tailed Hawk	c	o	c	c
Harlan's Hawk	u		u	u
*Red-shouldered Hawk	o	o	o	o

	S	S	F	W
Broad-winged Hawk	u	u	u	
Swainson's Hawk	o		o	
Rough-legged Hawk				c
Golden Eagle			r	r
Bald Eagle			c	c
*Marsh Hawk	c	o	c	c
Osprey	u		u	
Prairie Falcon			r	
Peregrine Falcon	o		o	
Pigeon Hawk	r		r	
Sparrow Hawk	u	u	u	u
*Bobwhite	u	u	c	c
*Ring-necked Pheasant	c	c	c	c
Sandhill Crane	r	r	r	
*King Rail	u	u	u	
*Virginia Rail	u	o	u	
Sora	c	u	c	
Yellow-Rail	r		r	
Common Gallinule	r	r		
American Coot	a	o	a	
Semipalmated Plover	o	o	o	
Piping Plover	r	r	r	
*Killdeer	c	c	c	o
American Golden Plover	o		r	
Black-bellied Plover	c	r	u	
Ruddy Turnstone	u	r	r	
American Woodcock	r		r	
Common Snipe	c	r	c	r
Long-billed Curlew	r			
*Upland Plover	r	r	r	
*Spotted Sandpiper	c	c	c	
Solitary Sandpiper	o	u	o	
Willet	o		o	
Greater Yellowlegs	o	u	o	
Lesser Yellowlegs	a	a	c	
Knot	r		r	
Pectoral Sandpiper	c	u	c	
White-rumped Sandpiper	c	u	c	
Baird's Sandpiper	o	o	o	
Least Sandpiper	o	o	o	
Dunlin	u		r	
Short-billed Dowitcher	r			
Long-billed Dowitcher	c	o	c	
Stilt Sandpiper	r			
Semipalmated Sandpiper	o	o	o	
Western Sandpiper	r		r	
Buff-breasted Sandpiper	r	r		
Marbled Godwit	r		r	
Hudsonian Godwit	c	r		
Sanderling	r	r	r	

	S	S	F	W
American Avocet	o	r	o	
Wilson's Phalarope	c	o	u	
Northern Phalarope	o	o	u	
Herring Gull	u	r	u	r
Ring-billed Gull	c	o	c	o
Franklin's Gull	a		a	
Bonaparte's Gull	r		r	
Forster's Tern	c	o	c	
Common Tern	o		o	
Least Tern	u	u		
Caspian Tern	r	r	r	
*Black Tern	c	c	o	
*Rock Dove	o	o	o	o
*Mourning Dove	a	a	a	o
*Yellow-billed Cuckoo	c	c	u	
Black-billed Cuckoo	o	o	u	
Barn Owl	r		r	
*Screech Owl	o	o	o	o
*Great Horned Owl	c	c	c	c
*Barred Owl	c	c	c	c
Long-eared Owl			r	r
Short-eared Owl	o	o	o	c
Saw-whet Owl				r
Chuck-will's widow	r	r		
*Whip-poor-will	o	o	r	
Common Nighthawk	o	o	o	
*Chimney Swift	o	o		
*Ruby-throated Hummingbird	o	o		
*Belted Kingfisher	o	o	o	
*Yellow-shafted Flicker	c	c	c	u
Red-shafted Flicker	r		r	
*Red-bellied Woodpecker	c	c	c	c
*Red-headed Woodpecker	o	o	o	o
*Yellow-bellied Sapsucker	o	o	o	o
*Hairy Woodpecker	u	u	u	u
*Downy Woodpecker	c	c	c	c
*Eastern Kingbird	c	c		
Western Kingbird	r		r	
*Great Crested Flycatcher	c	c	u	
*Eastern Phoebe	c	c	u	
Yellow-bellied Flycatcher	r		r	
*Acadian Flycatcher	u	u	u	
Least Flycatcher	u	u		
*Eastern Wood Pewee	u	c		
Olive-sided Flycatcher	u		u	
*Horned Lark	o	u	o	c
*Tree Swallow	c	c	c	
*Bank Swallow	a	o	a	
Rough-winged Swallow	o	o	o	
*Barn Swallow	c	o	a	

	S	S	F	W
Cliff Swallow	c	a	a	
Purple Martin	o		o	
*Blue Jay	c	c	c	c
*Common Crow	a	c	c	a
*Black-capped Chickadee	c	u	c	c
*Tufted Titmouse	c	o	o	c
*White-breasted Nuthatch	o	o	o	o
Red-breasted Nuthatch	r		r	o
Brown Creeper	u	u	u	u
*House Wren	c	c	o	
Winter Wren	r		r	r
Bewick's Wren	u	u	u	
*Carolina Wren	o	o	o	o
*Long-billed Marsh Wren	u	u	u	
*Short-billed Marsh Wren	u	u	u	
*Mockingbird	o	o	o	
*Catbird	c	c	o	
*Brown Thrasher	c	c	u	
*Robin	c	c	c	o
*Wood Thrush	o	o		
Swainson's Thrush	o		o	
Gray-cheeked Thrush	o		o	
*Eastern Bluebird	u	o	u	r
*Blue-gray Gnatcatcher	c	c		
Golden-crowned Kinglet	u		u	u
Ruby-crowned Kinglet	o		o	o
Water Pipit	r		r	
Bohemian Waxwing				o
Cedar Waxwing	c	c	c	o
Northern Shrike				o
Loggerhead Shrike	o	o	o	o
*Starling	c	c	c	a
White-eyed Vireo	o	r	r	
*Bell's Vireo	c	c	u	
Yellow-throated Vireo	o	r	o	
Solitary Vireo	r		r	
*Red-eyed Vireo	c	c	u	
Philadelphia Vireo	u		u	
*Warbling Vireo	o	o	u	
Black-and-white Warbler	u		u	
*Prothonotary Warbler	r	r	r	
Tennessee Warbler	u		u	
Orange-crowned Warbler	u		u	
Nashville Warbler	u		u	
Parula Warbler	u		u	
*Yellow warbler	c	c	u	
Magnolia Warbler	u		u	
Myrtle Warbler	c		c	
Black-throated Green Warbler	u		u	
Blackburnian Warbler	u		u	

	S	S	F	W
Chestnut-sided Warbler	u		u	
Blackpoll Warbler	u		u	
Palm Warbler	u		u	
*Ovenbird	u	u	u	
Louisiana Waterthrush	u		u	
*Kentucky Warbler	r	u		
*Yellowthroat	c	c	u	
*Yellow-breasted Chat	c	c		
Wilson's Warbler	u		u	
American Redstart	c		u	
*House Sparrow	a	a	a	a
*Bobolink	u	u	u	
*Eastern Meadowlark	c	u	c	o
Western Meadowlark	o	o	o	o
*Yellow-headed Blackbird	u	u	u	r
*Red-winged Blackbird	a	c	a	a
*Orchard Oriole	c	c	o	
*Baltimore Oriole	o	c	r	
Rusty Blackbird	c		c	o
Brewer's Blackbird	o	o	o	
*Common Grackle	c	c	c	c
*Brown-headed Cowbird	c	c	c	o
*Scarlet Tanager	o	o	r	
*Summer Tanager	r	u		
*Cardinal	a	a	a	a
*Rose-breasted Grosbeak	o	o		
*Indigo Bunting	c	c	o	

	S	S	F	W
Painted Bunting	r	r		
*Dickcissel	c	c		
Purple Finch				r
Pine Siskin				o
*American Goldfinch	c	c	c	o
Red Crossbill				r
White-winged Crossbill				r
*Rufous-sided Towhee	c	c	c	o
Savannah Sparrow	o	u	o	
Grasshopper Sparrow	o	u	o	
Le Conte's Sparrow	o		o	
Henslow's Sparrow	u	u	u	
*Vesper Sparrow	c	o	c	
Lark Sparrow	o	o	o	
Slate-colored Junco	c		c	c
Tree Sparrow	c		c	c
*Chipping Sparrow	o	u	o	
Clay-colored Sparrow	o		o	
*Field Sparrow	c	o	c	
Harris' Sparrow	o		o	u
White-crowned Sparrow	c		c	o
White-throated Sparrow	c		c	o
Fox Sparrow	o		o	u
Lincoln's Sparrow	o		o	
*Swamp Sparrow	u	o	u	o
*Song Sparrow	c	c	c	u

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These additional 23 species are of such accidental or rare occurrence on the refuge that they have seldom been recorded more than once or twice.

Western Grebe
Cattle Egret
Louisiana Heron
White Ibis
American Flamingo
Brant
Ross' Goose
Black-bellied Tree Duck
Fulvous Tree Duck
European Widgeon
Mississippi Kite
Whooping Crane
Snowy Plover
Whimbrel
Black-necked Stilt
Ground Dove
Snowy Owl
Black-backed Three-toed Woodpecker
Scissor-tailed Flycatcher
Black-billed Magpie
Veery
Lark Bunting
Oregon Junco

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